

A Stereo-Atlas of Ostracod Shells

edited by R. H. Bate, D. J. Horne, J. W. Neale,
and David J. Siveter

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Instructions to Authors

Contributions illustrated by scanning electron micrographs of Ostracoda in stereo-pairs are invited. Format should follow the style set by the majority of papers in this issue. Descriptive matter apart from illustrations should be cut to a minimum; preferably each plate should be accompanied by one page of text only. Blanks to aid in mounting figures for plates may be obtained from any one of the Editors or Editorial Board. Completed papers should be sent to Dr David J. Siveter.

The front cover shows a left valve of *Neolimnocythere hexaceros* Delachaux, 1928, from Quaternary Deposits at Lago Junin, Peru. Photograph by Dr P. De Deckker, University of Monash, Victoria, Australia.

ON CATHAYCYTHERE RETICULATA WHATLEY & ZHAO gen. et sp. nov.

by Robin Whatley & Zhao Quanhong
(University College of Wales, Aberystwyth, UK & Tongji University, Shanghai, China)

Genus *CATHAYCYTHERE* gen. nov.

Type-species: *Cathaycythere reticulata* gen. et sp. nov.

Derivation of name: From Cathay (China) + cythere; with reference to the type locality of the type-species in the South China Sea.

Diagnosis: Medium sized; subrectangular in lateral view, highest anterodorsally and longest subventrally; anterior margin broadly rounded; posterior margin truncate above and bluntly pointed below. Carapace laterally compressed at both end margins. Eye-tubercle and internal ocular sinus absent. Surface coarsely and irregularly reticulate with a prominent subcentral node surrounded by a subcircular sulcus. Hinge holamphidont with high conical anterior tooth, bulbous posterior tooth and locellate median element in right valve. Inner lamella wide with a marked oval excavation posteriorly aligned parallel to the postero-dorsal slope of the posterior margin; very narrow vestibulae at each end; radial pore canals few, long, thin and simple. Adductor scars relatively small, consisting of a vertical row of four; frontal scar single, oval.

Explanation of Plate 14, 2

Fig. 1, RV, ext. lat. (holotype, **1986.404**, 710µm long); fig. 2, LV, ext. lat. (paratype, **1986.405**, 665µm long); fig. 3, LV, ext. lat. (paratype, **1986.406**, 665µm long).

Scale A (100µm; ×90), figs. 1-3.

Remarks: The excavation on the wide posterior inner lamella is not known to occur in any other genus and can be used to distinguish it from *Sinocythere* Hou, 1978. The latter is closest in ornament and muscle scar pattern to the present genus, but differs in hingement (hemiamphidont with clearly crenulate posterior tooth) and in lacking the posterior excavation on the inner lamella. *Krithe* exhibits a similar excavation posteriorly but it occurs distal to the selva whereas in *Cathaycythere* it is proximal. The familial status of *Cathaycythere* is uncertain and possibly a new family is required to accommodate this genus and *Sinocythere* (see Whatley & Zhao, *Stereo-Atlas Ostracod Shells* 14, 5-8, 1987).

Cathaycythere reticulata Whatley & Zhao gen. et sp. nov.

Holotype: British Museum (Nat. Hist.) no. **1986.404**; RV.

[Paratypes: British Museum (Nat. Hist.) nos. **1986.405-409**.]

Type locality: Off Guangxi Province of China, Gulf of Tonkin, South China Sea; lat. 21° 29' 09"N, long. 108° 44' 46"E. Recent, water depth: 14m.

Derivation of name: With reference to its reticulate surface.

Figured specimens: British Museum (Nat. Hist.) nos. **1986.404** (holotype, RV: Pl. 14, 2, fig. 1), **1986.405** (paratype, LV: Pl. 14, 2, fig. 2), **1986.406** (paratype, LV: Pl. 14, 2, fig. 3), **1986.407** (paratype, car.: Pl. 14, 4, fig. 1), **1986.408** (paratype, LV: Pl. 14, 4, fig. 2), **1986.409** (paratype, RV: Pl. 14, 4, fig. 3). Nos. **1986.404-406** are from the type locality. Nos. **1986.407-409** are from lat. 21° 15' 46"N, long. 109° 24' 57"E; Recent, water depth: 14m.

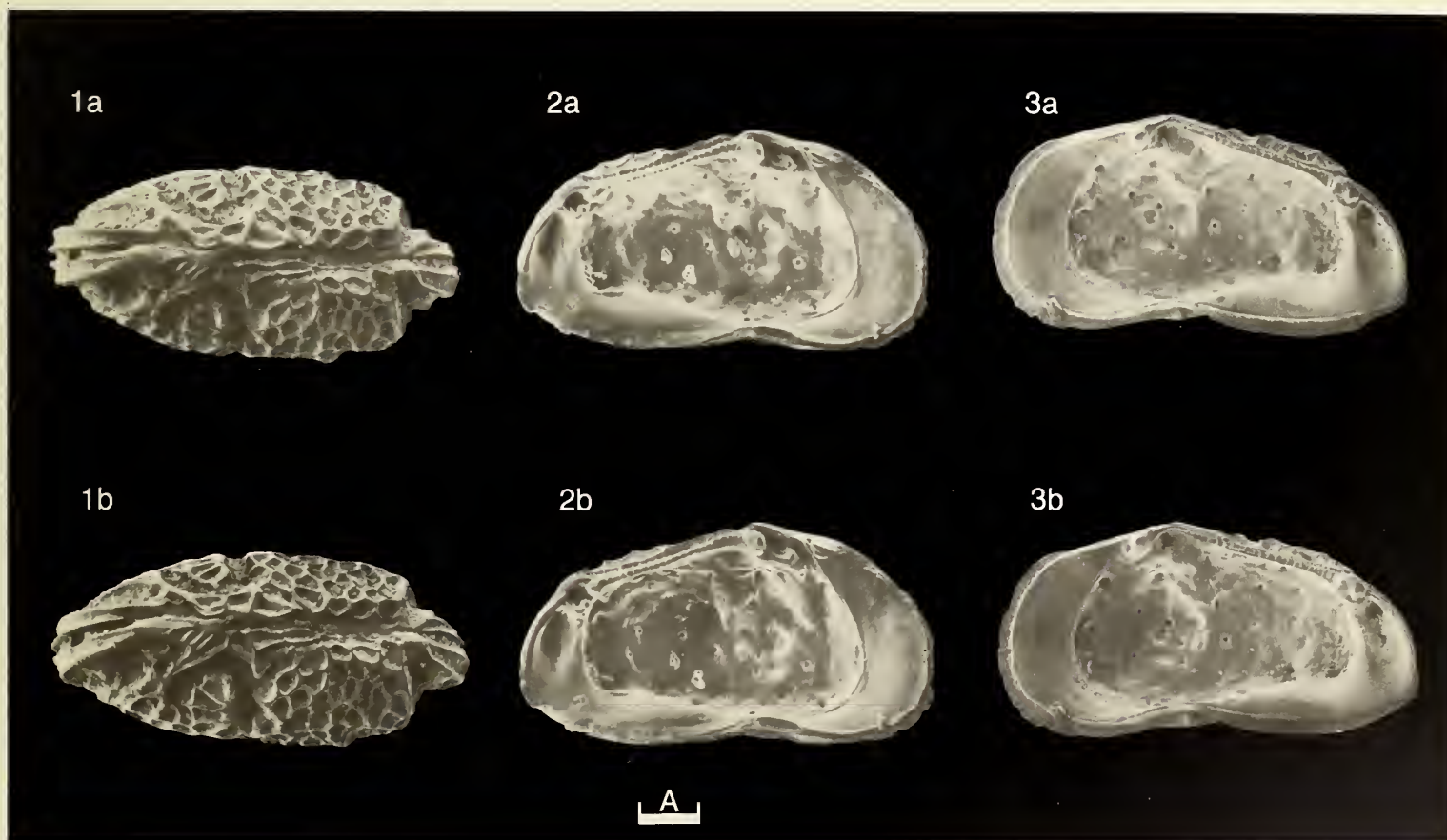
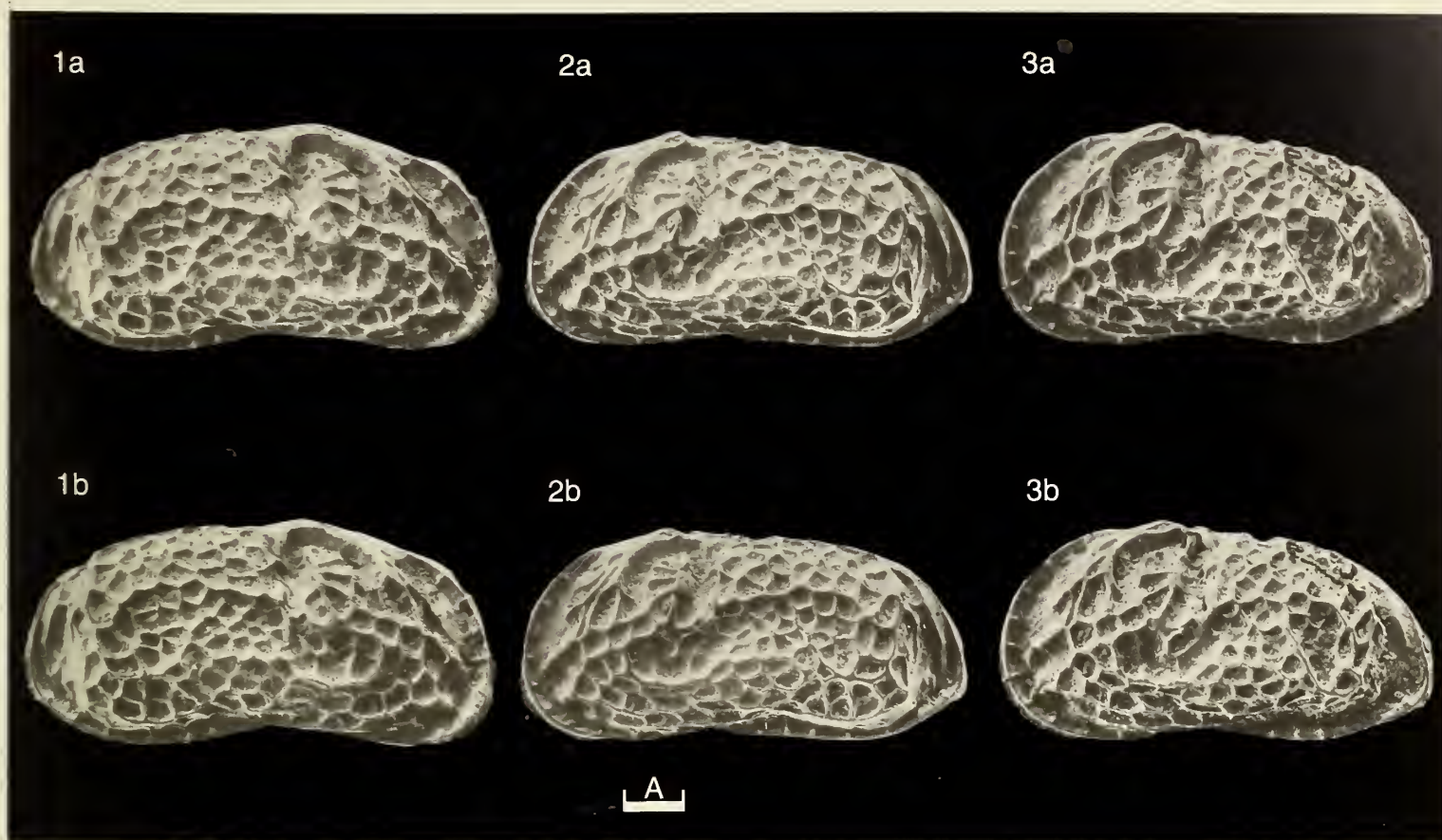
Diagnosis: As for the genus. Monotypic.

Distribution: In four bottom samples off Guangxi Province, China, northern Gulf of Tonkin, South China Sea. Water depth: 10 – 16m; substrate: mud to fine sand.

Explanation of Plate 14, 4

Fig. 1, car., ext. dors. (paratype, **1986.407**, 635µm long); fig. 2, LV, int. lat. (paratype, **1986.408**, 635µm long); fig. 3, RV, int. lat. (paratype, **1986.409**, 645µm long).

Scale A (100µm; ×90), figs. 1-3.



ON *SINOCY THERE SINENSIS* HOU

by Robin Whatley & Zhao Quanhong

(University College of Wales, Aberystwyth, UK & Tongji University, Shanghai, China)

Genus *SINOCY THERE* Hou, 1982

Type-species (by original designation): *Sinocythere sinensis* Hou, 1982

Diagnosis: Medium sized; subrectangular in lateral view with parallel dorsal and ventral margins, prominent posterior cardinal angle and obtusely rounded posterior margin. Eye-tubercle weakly developed but internal ocular sinus not developed. Surface reticulate with an anteromedian node surrounded by a subcircular sulcus. Hinge hemiamphidont: anterior tooth in right valve conical, posterior tooth curved and distinctly dentate; in left valve, anterior socket enclosed ventrally by an anterior extension of the anteromedian conical tooth, posterior socket with an anti-slip toothlet ventromedianly, and median bar denticulate. Inner lamella relatively wide with shallow anterior vestibule; radial pore canals few, thin and simple. Adductor muscle scars small, consisting of a vertical row of four scars all in contact; frontal scar single, oval.

Remarks: This genus is close to *Spinoleberis* Hanai, 1961 in many features except that the latter has a triangular outline and much narrower, more acute posterior margin in lateral view, and three longitudinal ribs. In external characters *Sinocythere* is somewhat similar to *Palmeniella* Hirschman, 1916, but the latter bears a schizodont hinge. *Cathacythere* Whatley & Zhao, 1987 (*Stereo-Atlas Ostracod Shells* 14, 1-4) has similar ornament and also the circular sulcus surrounding the anteromedian node. The two genera differ in hingement and *Sinocythere* lacks the excavated posterior inner lamella so typical of *Cathacythere*. *Sinocythere* and *Cathacythere* are probably worth including in a new family of Cytheracea.

Explanation of Plate 14, 6

Fig. 1, ♂ RV, ext. lat. (1986.410, 570µm long); fig. 2, ♀ car., rt. lat. (1986.411, 540µm long); fig. 3, ♀ car., lt. lat. (1986.411, 540µm long). Scale A (100µm; ×110), figs. 1-3.

Sinocythere sinensis Hou, 1982

1982 *Sinocythere sinensis* sp. nov. Hou in Hou et al., *Cretaceous-Quaternary ostracode fauna from Jiangsu*, 242, text-fig. 77; pl. 87, figs. 16-19.

1985 *Sinocythere sinensis* Hou; Zhao, *Acta Oceanologica Sinica*, pl. 2, fig. 10.

1985 *Sinocythere sinensis* Hou; Wang and Zhao, in Wang et al., *Marine Micropaleontology of China*, pl. 18, fig. 4.

Holotype: Nanjing Institute Geology & Paleontology, Academia Sinica; no. 4107, ♀ LV. Not figured herein.

Type locality: Jiangsu Province, Eastern China; Dongtai Formation, Quaternary.

Figured specimens: British Museum (Nat. Hist.) nos. 1986.410 (♂ RV: Pl. 14, 6, fig. 1; Pl. 14, 8, fig. 3), 1986.411 (♀ car.: Pl. 14, 6, figs. 2, 3; Pl. 14, 8, fig. 1), 1986.412 (♀ LV: Pl. 14, 8, fig. 2). All Recent, collected from the littoral of Jiangsu Province, China; approx. lat. 34° 17'N, long. 120° 17'E.

Diagnosis: Irregularly polygonal surface reticulation with superimposed narrow, oblique posterodorsal-anteroventral rib, and a bifid rib running from the anterior cardinal angle obliquely to mid-anterior. Female carapace strongly laterally compressed posterodorsally, posteriorly and ventrally; the male is inflated in these areas.

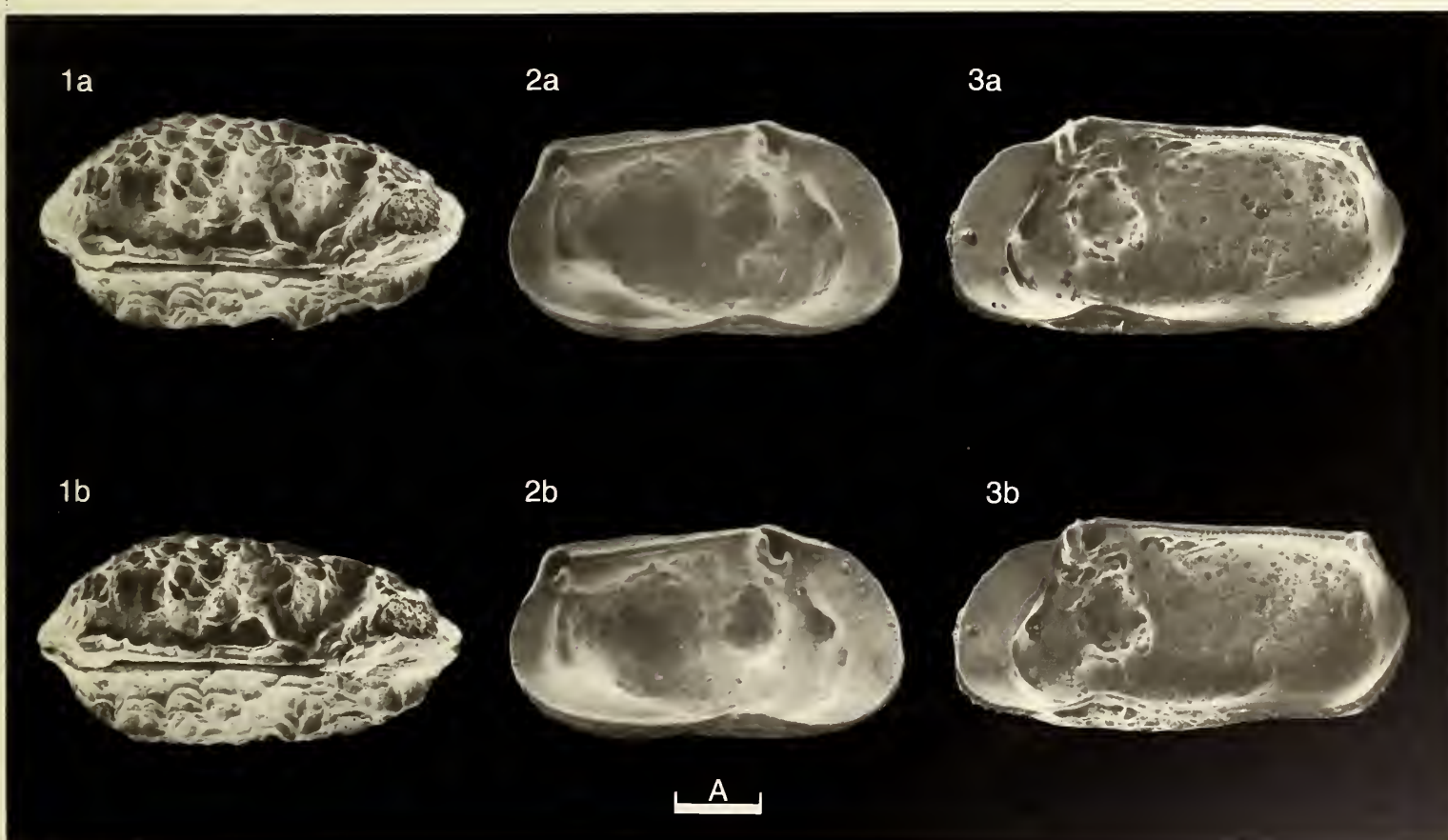
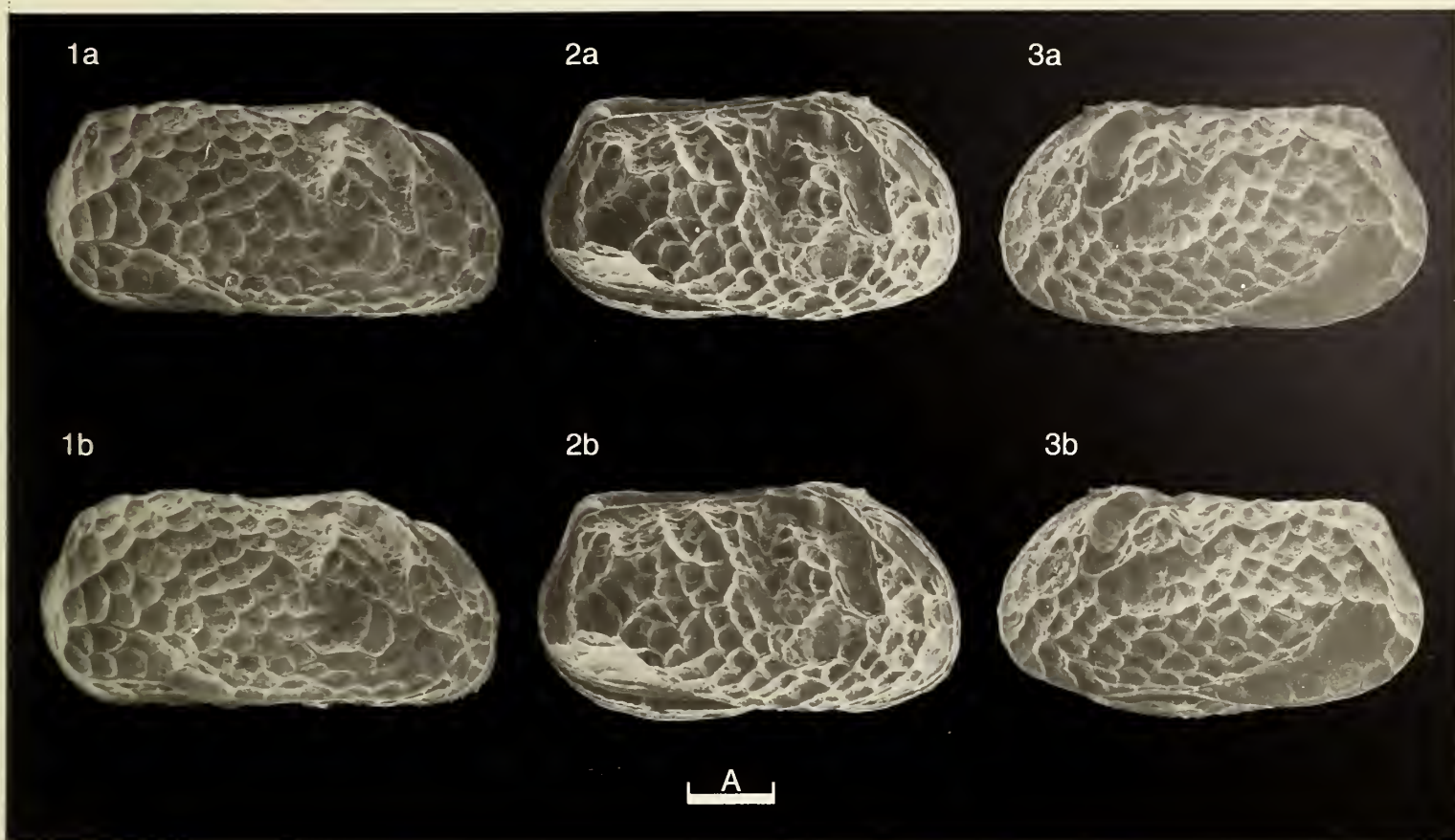
Remarks: This species is very close to *S. dongtaiensis* Chen, 1982 in outline and overall ornamentation, but the latter is much more weakly reticulate.

Distribution: Pliocene to Recent, Eastern China. Recent specimens most abundant in littoral zone and inner shelf shallower than 20m, rare in estuaries and water depths from 20 to 200m.

Explanation of Plate 14, 8

Fig. 1, ♀ car., ext. dors. (1986.411, 540µm long); fig. 2, ♀ LV, int. lat. (1986.412, 490µm long); fig. 3, ♂ RV, int. lat. (1986.410, 570µm long).

Scale A (100µm; ×110), figs. 1-3.



ON *ALBILEBERIS SINENSIS* HOU

by Zhao Quanhong & Robin Whatley
(Tongji University, Shanghai, China & University College of Wales, Aberystwyth, UK)

Genus *ALBILEBERIS* Hou, 1982

Type-species: *Albileberis sinensis* Hou, 1982

Diagnosis: Small to medium, laterally compressed; subovate to rectangular in lateral view with greatest height anteromedianly. Bluntly truncate posterior and well rounded anterior margins. Surface smooth, pitted or reticulate. Hinge between paleomerodont and holomerodont: all positive elements in right valve, long ridge-like anterior tooth thickened anteriorly with a prominent square terminal toothlet, median bar smooth anteriorly and faintly crenulate posteriorly, posterior tooth curved and denticulate. Complementary negative elements in left valve with an anti-slip bar below median groove and anterior socket, and two small terminal anti-slip toothlets respectively at anterior and posterior ends. Inner lamella moderately wide with large vestibulae and narrow fused zone; radial pore canals moderate in number and simple. Adductor muscle scars a vertical row of four; frontal scar V-shaped; fulcral point crescentic and prominent.

Remarks: Although the generic name *Albileberis* was first published in Guan *et al.* (*Paleontological Atlas of Central & S China* (4): *Ostracoda*, 1978), who attributed the genus to Hou from an earlier MS name, its type-species was not published until 1982 (Hou *in* Hou *et al.*). This genus is easily identified by its laterally compressed carapace, outline and peculiar hingement, and probably belongs to the Cytherideinae based on its internal characters.

Explanation of Plate 14, 10

Fig. 1, ♀ RV, ext. lat. (1986.413, 525µm long); fig. 2, ♀ LV, ext. lat. (1986.414, 525µm long); fig. 3, ♂ LV, ext. lat. (1986.415, 495µm long).
Scale A (100µm; ×120), figs. 1-3.

Albileberis sinensis Hou, 1982

1982 *Albileberis sinensis* sp. nov. Hou, *in* Hou *et al.*, *Cretaceous-Quaternary ostracode fauna from Jiangsu.*, 240-241, text-fig. 75, pl. 88, figs. 1-7.

1985 *Albileberis sinensis* Hou; Zhao, *Acta Oceanologica Sinica*, pl. 1, fig. 9.

1985 *Albileberis sinensis* Hou; Wang & Zhao, *in* Wang *et al.*, *Marine Micropaleontology of China*, pl. 7, fig. 2, text-fig. 5.

Holotype: Nanjing Institute Geology & Paleontology, Academia Sinica; no. 41062; ♀ LV. Not figured herein.

Type locality: Jiangsu Province, E China: Dongtai Formation, Quaternary.

Figured specimens: British Museum (Nat. Hist.) nos. 1986.413 (♀ RV: Pl. 14, 10, fig. 1), 1986.414 (♀ LV: Pl. 14, 10, fig. 2), 1986.415 (♂ LV: Pl. 14, 10, fig. 3), 1986.416 (♀ car.: Pl. 14, 12, fig. 1), 1986.417 (♀ LV: Pl. 14, 12, fig. 2), 1986.418 (♀ RV: Pl. 14, 12, fig. 3). All Recent, collected from the littoral of Jiangsu Province, China; approx. lat. 34° 17'N, long. 120° 17'E.

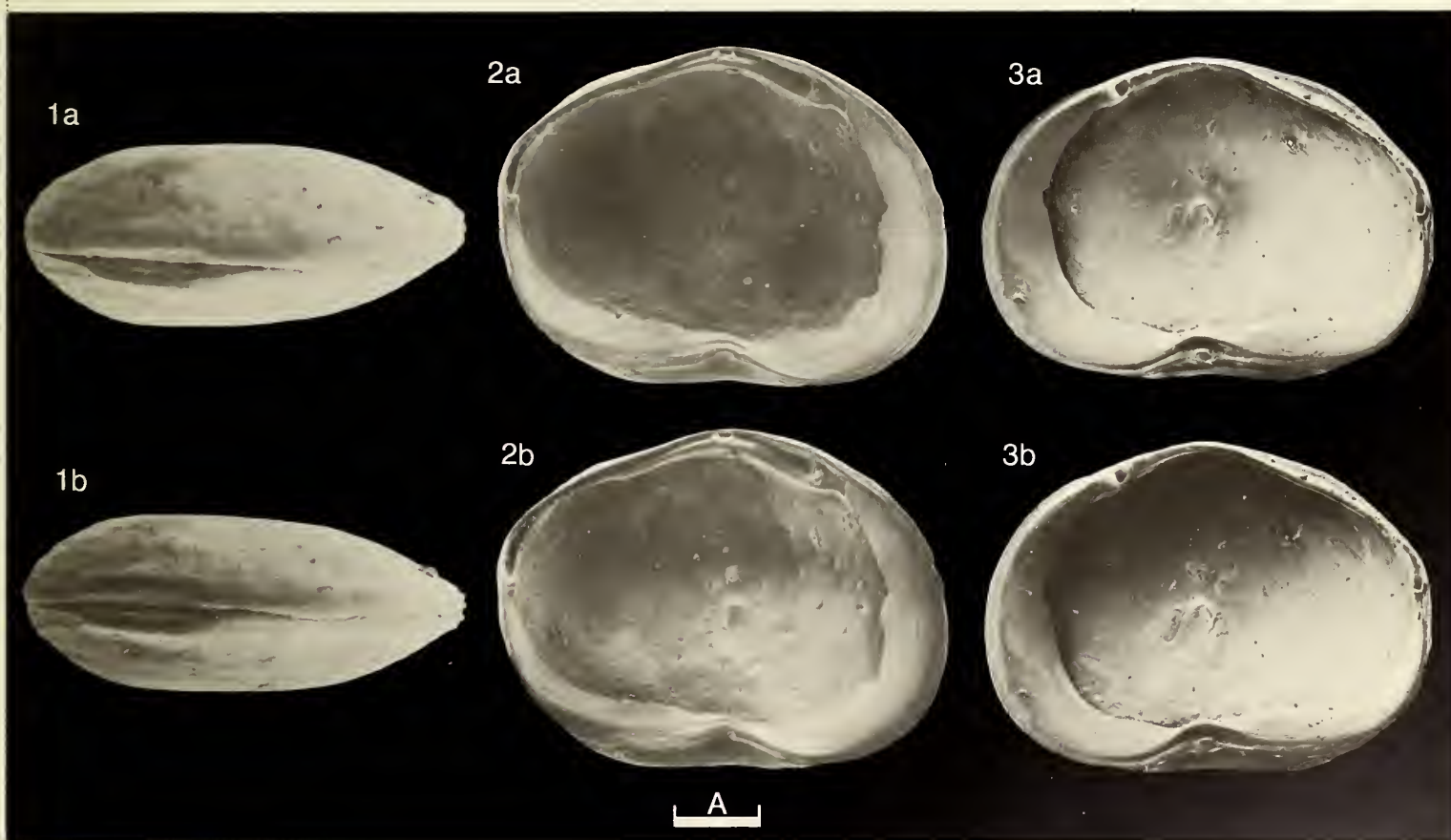
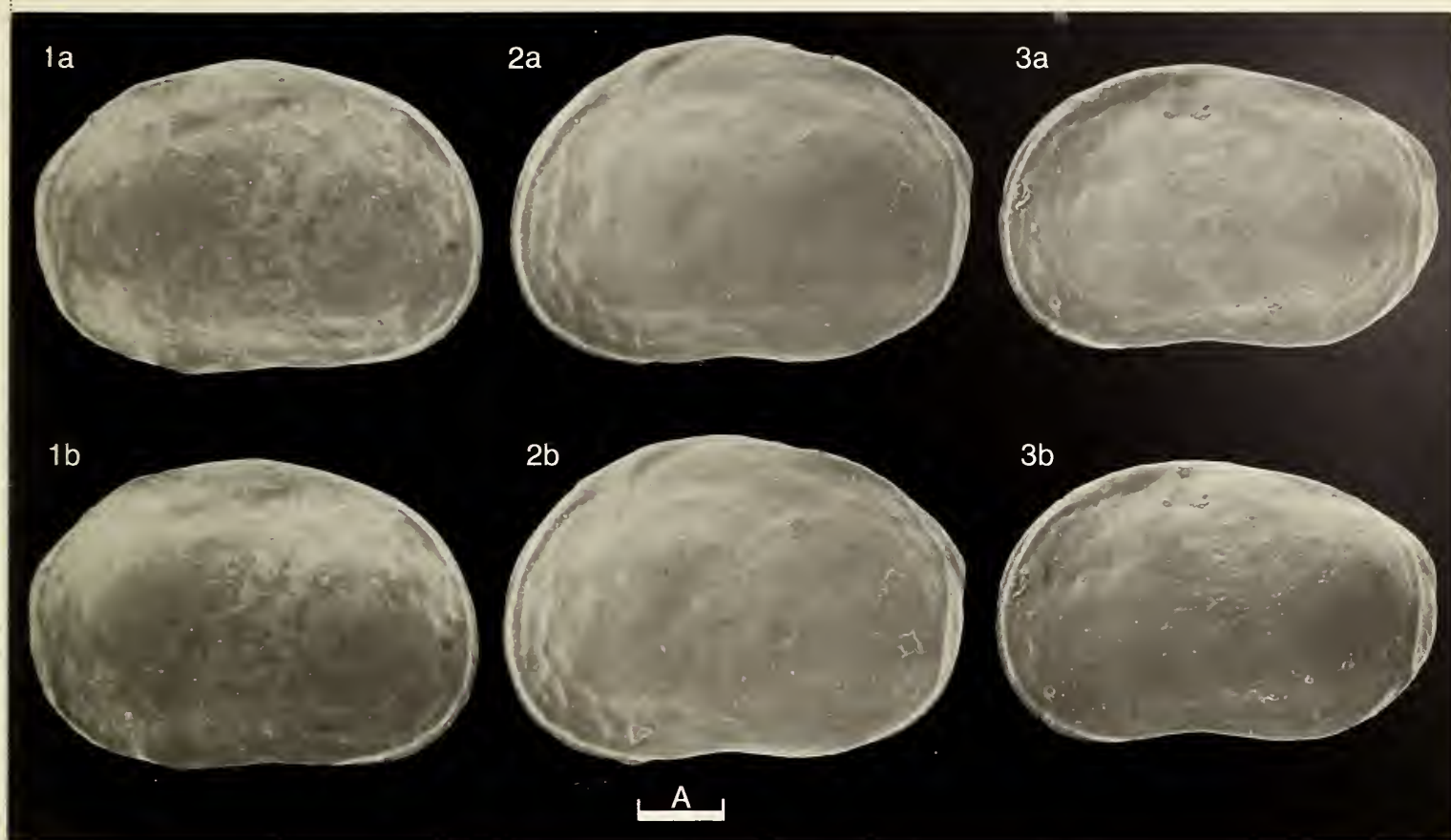
Diagnosis: Subovate in lateral view with vertical truncated posterior margin, surface smooth with few very weak reticulae around the margins.

Remarks: Markedly differs from the other two species in this genus. *A. sheyangensis* Chen, 1982 is much more elongate and lower with obliquely truncated posterior margin, and *A. asperata* Guan, 1978 has an ornamentation of coarse reticulation.

Distribution: China, Quaternary to Recent. At the present day this species is abundant and widespread in brackish and nearshore waters along the coast of the East China and Yellow Seas with a salinity range of 3‰ to normal sea water, including marshes, estuaries, littoral and the inner shelf shallower than 50m.

Explanation of Plate 14, 12

Fig. 1, ♀ car., ext. dors. (1986.416, 535µm long); fig. 2, ♀ LV, int. lat. (1986.417, 515µm long); fig. 3, ♀ RV, int. lat. (1986.418, 515µm long).
Scale A (100µm; ×120), figs. 1-3.



ON *SINOCYTHERIDEA IMPRESSA* (BRADY)

by Zhao Quanhong & Robin Whatley

(Tongji University, Shanghai, China & University College of Wales, Aberystwyth, UK)

Genus *SINOCYTHERIDEA* Hou, 1978

Type-species (by subsequent designation) : *S. latiovata* Hou & Chen, 1982
(= *Cytheridea impressa* Brady, 1869; see below)

Diagnosis: A genus of Cytherideidae characterized by its modified antimerodont hingement with a conspicuous anti-slip toothlet anteriorly in the left valve, by which it can be readily distinguished from such similar genera as *Cyprideis* Jones, 1857, *Neocyprideis* Apostolescu, 1965 and *Sarsicytheridea* Athersuch, 1982.

Remarks: *Sinocytheridea* was named by Hou in manuscript more than 20 years ago but remained unpublished until Guan *et al.* (1978) first applied this name for the genus in a published work, attributing the genus to Hou and using Hou's original description. *S. latiovata* Hou & Chen, 1982 was designated by Hou and Chen in Hou *et al.* (1982) as the type-species of *Sinocytheridea*. The present authors, however, have recently studied Brady's material from Hong Kong which is deposited in the Hancock Museum and consider *S. latiovata* and *Cytheridea impressa* Brady, 1869 to be conspecific. We therefore consider *C. impressa* to be the type-species of *Sinocytheridea*.

Explanation of Plate 14, 14

Figs. 1, ♀ car., rt. ext. lat (paralectotype, 1.23.44, 740 µm long); fig. 2, ♀ LV. ext. lat. (1986.419, 720 µm long); fig. 3, ♀ car., ext. dors. (1986.421, 750 µm long).
Scale A (100 µm; × 85), figs. 1-3.

Sinocytheridea impressa (Brady, 1869)

- 1869 *Cytheridea impressa* sp. nov. G.S. Brady in L. De Folin and L. Perier (eds.). *Les Fonds de la Mer.*, 158, pl. 16, figs. 13, 14.
1978 *Cyprideis yehi* Hu & Yeh, *Geol. Soc., China (Taiwan), Proc.*, 21, 157-159, text-fig. 5, pl. 3, figs. 10-13.
1978 *Sinocytheridea sinensis* Hou; Hou in Guan *et al.*, *Paleontological Atlas Central & S China* (4): *Ostracoda*, 240, pl. 65, figs. 1-5.
1982 *Sinocytheridea latiovata* sp. nov. Hou & Chen in Hou *et al.*, *Cretaceous-Quaternary ostracode fauna from Jiangsu*, 164-165, text-figs. 26a-c, pl. 72, figs. 10-20.

- 1982 *Sinocytheridea longa* Hou & Chen, *ibid.* 165-166, text-figs. 27a-c, pl. 72, figs. 1-9.

Lectotype: Hancock Museum, Newcastle-upon-Tyne, England, no. 1.24.37, ♀ LV.

[Paralectotypes: Hancock Mus., nos. 1.24.38, ♀ RV; 1.23.44, ♀ car.]

Type locality: Hong Kong Harbour; Recent.

Figured specimens: Hancock Museum, Newcastle-upon-Tyne, England, nos. 1.24.37 (lectotype, ♀ LV: Pl. 14, 16, fig. 2), 1.24.38 (paralectotype, ♀ RV: Pl. 14, 16, fig. 3), 1.23.44 (paralectotype, ♀ car.: Pl. 14, 14, fig. 1), Brit. Mus. (Nat. Hist.) nos. 1986.419 (♀ LV: Pl. 14, 14, fig. 2), 1986.421 (♀ car.: Pl. 14, 14, fig. 3), 1986.420 (♂ LV: Pl. 14, 16, fig. 1). Nos. 1.23.44, 1.24.37 and 1.24.38 belong to the Brady Collection in the Hancock Museum and are from the type-locality; nos. 1986.419-431 are from the Pohai Bay, China, lat. 39° 50'N, long. 118° 46'E, water depth: 15m.

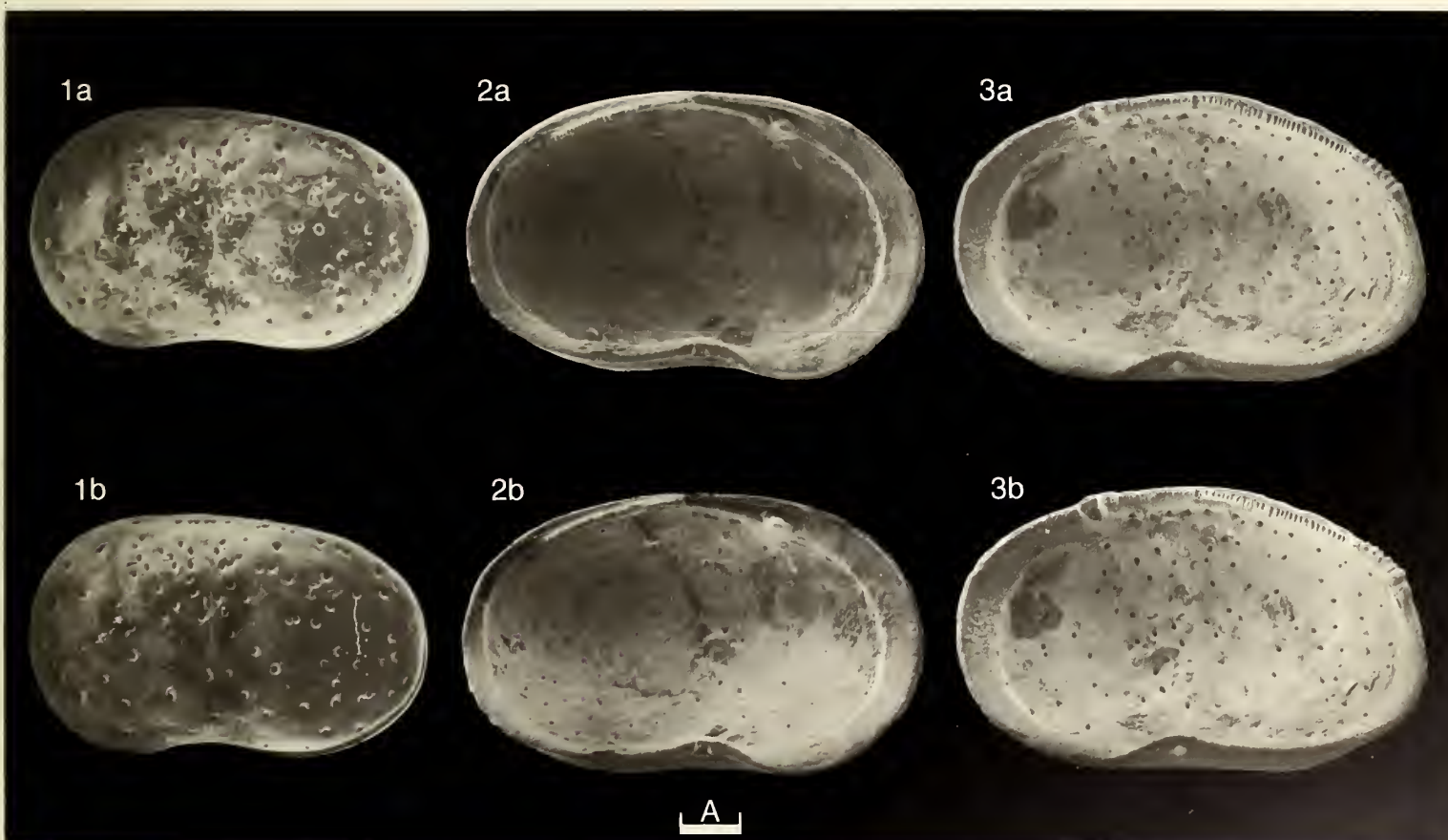
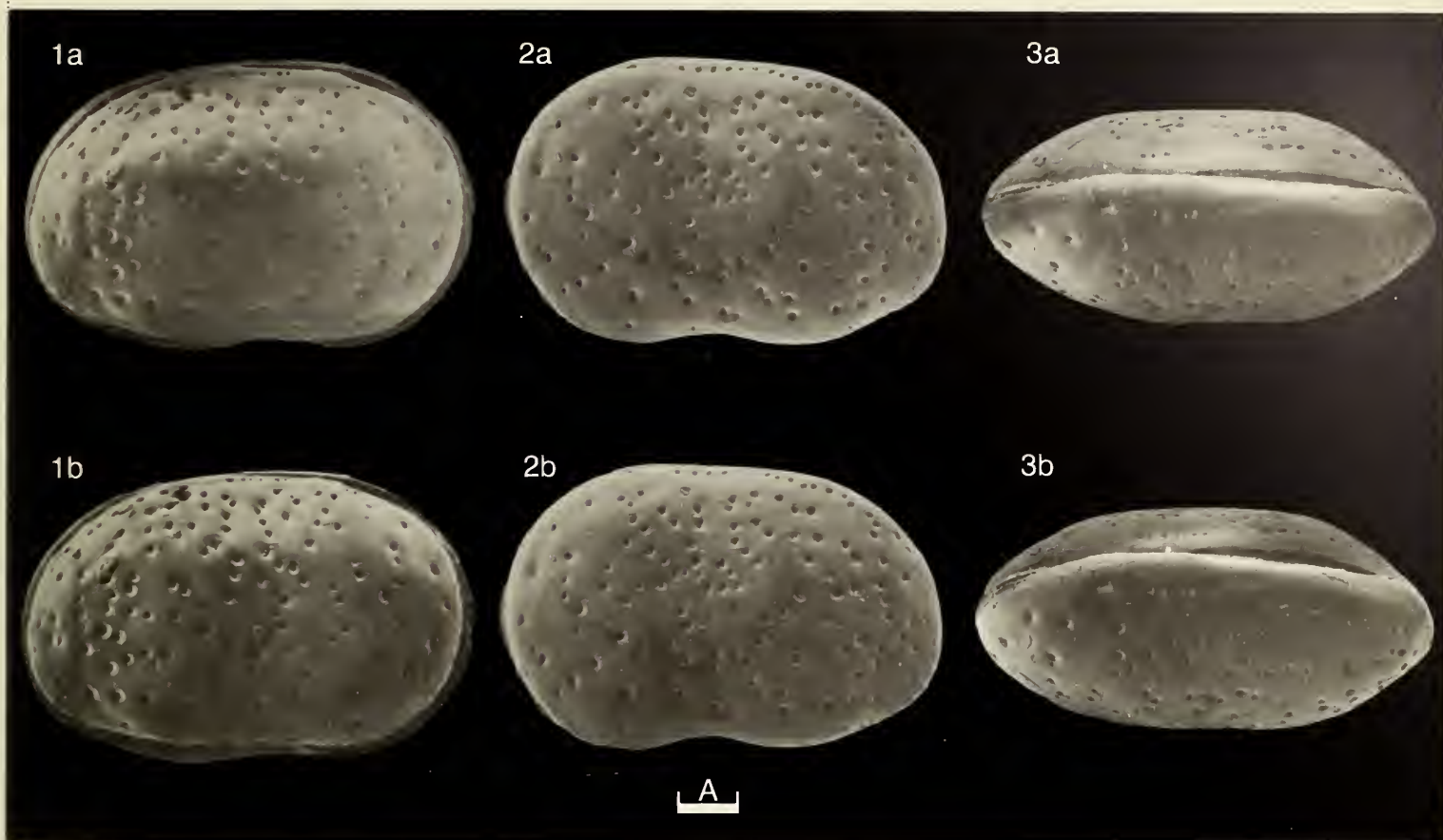
Diagnosis: Elongate-oval without obvious trace of angle in lateral view. RV larger than and slightly overlapping LV along the periphery except anterior margin. Surface smooth with rounded shallow pits (openings of sieve-type normal pore canals). Avestibulate, radial pore canals few, simple. Adductor muscle scar a vertical row of four elongate scars; frontal scar V-shaped.

Remarks: Apart from the more elongate outline, *S. longa* Hou & Chen is identical in carapace features to *S. impressa*. The authors believe that the former species is based on males of *S. impressa*.

Distribution: Pliocene to Recent, China. The modern representatives occur widely in shelf, littoral, estuaries, marshes, tidal pools and channels of the supralittoral zone along the entire coast of China with a salinity distribution ranging from about 2‰ to normal sea water and a water depth ranging from middle shelf (50-100m) to supralittoral.

Explanation of Plate 14, 16

Fig. 1, ♂ LV, ext. lat. (1986.420, 660 µm long); fig. 2, ♀ LV, int. lat. (lectotype, 1.24.37, 775 µm long); fig. 3, ♀ RV, int. lat. (paralectotype, 1.24.38, 740 µm long). Scale A (100 µm; × 85), figs. 1-3.



ON *PTERYGOCYTHEREIS VANNIEUWENHUISEI* BROUWERS sp. nov.

by Elisabeth M. Brouwers
(U.S. Geological Survey, Denver)

Pterygocythereis vannieuwenhuisei sp. nov.

1986 *Pterygocythereis* sp. nov. C. A. Repenning, E. M. Brouwers, *et al.*, *Bull. U.S. Geol. Surv.*, **1687**, pl. 1, fig. 1.

Holotype: U.S. National Museum no. **410130**, ♂ RV.

[Paratypes: U.S. National Museum nos. **410131-410134**].

Type locality: Cutbank on a tributary of the Kalikpik River, Arctic coastal plain, North Slope, Alaska (lat. 70° 26.7'N, long. 152° 09.4'W); Pliocene. Outcrop consists of 1.8m of late Pliocene marine clay and sand overlain by 5.5m of Pleistocene fluvial and eolian sands. Deeper inner sublittoral to middle sublittoral water depths; cold temperate to subfrigid marine climate.

Derivation of name: In honour of Don Van Nieuwenhuise, research geologist at Amoco Production, Houston.

Figured specimens: U.S. National Museum nos. **410130** (holotype, ♂ RV: Text-fig. 1), **410131** (paratype, ♀ LV: Pl. **14**, 18, fig. 1), **410132** (paratype, ♂ RV: Pl. **14**, 18, fig. 2), **410133** (paratype, ♂ LV: Pl. **14**, 20, fig. 1), **410134** (paratype, LV: Pl. **14**, 20, fig. 2). All from the type locality and horizon (locality 83-EB-187, 188, collected by E. Brouwers, 1983).

Diagnosis: Short, high, rectangular lateral outline; large size; weak dimorphism. Three pairs of spines in median valve area; large, strong marginal spines. Wide marginal flange, continuous along anterior and venter. Numerous ventral marginal spines. Spinose anterodorsal margin with weak underlying flange. Strong posteroventral spinose prolongation. Left valve hinge has anterior socket with ventral rim; elongate, U-shaped posterior socket; cylindrical posteromedian tooth; weakly crenulate median bar.

Explanation of Plate 14, 18

Fig. 1, ♀ LV, ext. lat. (paratype, **410131**, 1380µm long); fig. 2, ♂ RV, ext. lat. (paratype, **410132**, 1460µm long). Scale A (100µm; ×125), figs. 1, 2.

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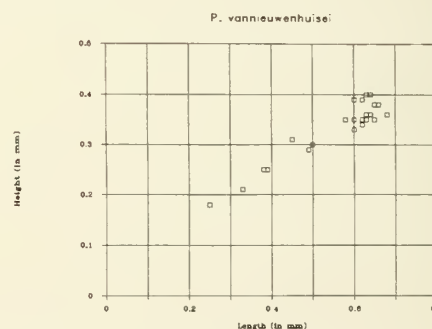
Pterygocythereis vannieuwenhuisei (3 of 4)

Remarks: *Pterygocythereis* ranges from the Paleocene-Holocene, occurring commonly throughout the subtropical and temperate N Atlantic Ocean and rarely in the subfrigid Norwegian Sea. In the northwestern Atlantic Ocean, *Pterygocythereis* occurs in the southern cold temperate zone, but does not live in the northern cold temperate or subfrigid zones of the western N Atlantic. *Pterygocythereis vannieuwenhuisei* is related to the European *P. mucronata*-*P. jonesii* species complex and not to the more temperate NW Atlantic *P. americana*-*P. inexpectata* lineage.

Distribution: ?Late Miocene, early-late Pliocene (to 2.48 Ma): NE Alaska, three localities in Colvillian-aged sediments of the Gubik Fm. (Fish Creek, Kalikpik R., Miluveach Creek; 2.48 – 3.0 Ma, late Pliocene; Repenning *et al.*, *op. cit.*), three localities in the upper Nuwok Member of the Sagavanirktok Fm. (Carter Creek, Barter Is., Manning Pt.; ?late Miocene, lower to middle Pliocene).



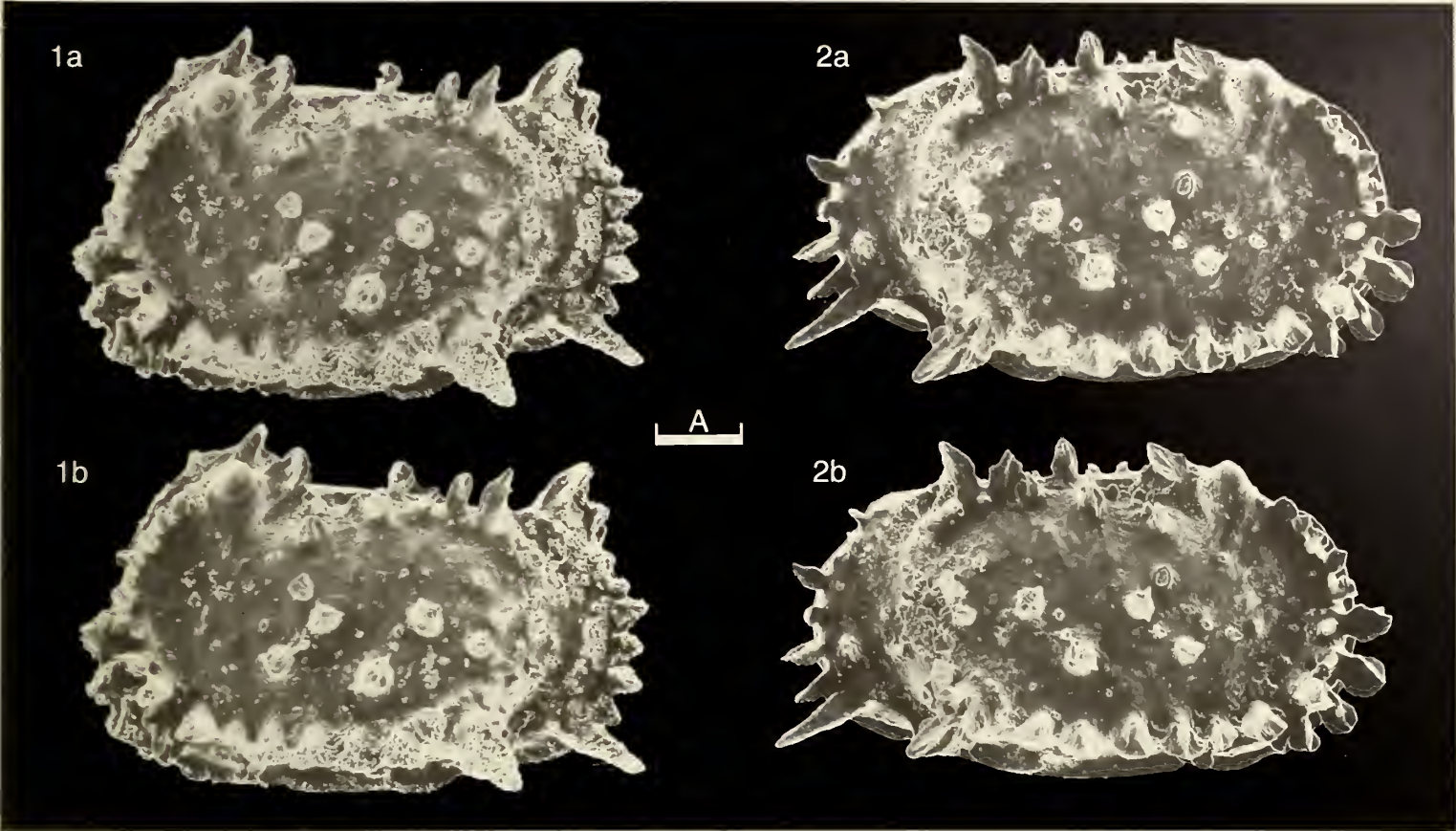
Text-fig. 1. Holotype (♂ RV, USNM no. **410130**), camera lucida drawing, seen in transmitted light.



Text-fig. 2. Plot of length vs. height for 26 specimens from the type locality.

Explanation of Plate 14, 20

Fig. 1, ♂ LV, ext. lat. (paratype, **410133**, 1280µm long); fig. 2, LV, int. lat. (paratype, **410134**, 1300µm long). Scale A (100µm; ×125), figs. 1, 2.



ON *MUELLERINA HAZELI* COLES & CRONIN sp. nov.

by Graham P. Coles & Thomas M. Cronin
(University College of Wales, Aberystwyth & U.S. Geological Survey, Reston, Virginia)

Muellerina hazeli sp. nov.

Holotype: British Museum (Nat. Hist.) no. **OS 12971**, ♀ LV.

[Paratypes: British Museum (Nat. Hist.) nos. **OS 12972-OS 12975**. Four additional paratypes have been deposited in the U.S. Museum of Natural History: USNM nos. **409239-409242**].

Type locality: Off the Florida Keys, United States continental slope; approx. lat. 24° 26'N, long. 81° 38'W; Recent, water depth 107m.

Derivation of name: In honour of Joseph E. Hazel, in recognition of his studies on *Muellerina* from the Atlantic Coastal Plain and shelf.

Figured specimens: British Museum (Nat. Hist.) nos. **OS 12971** (holotype, ♀ LV: Pl. 14, 22, fig. 1; Pl. 14, 24, fig. 1), **OS 12972** (paratype, ♀ RV: Pl. 14, 22, fig. 2), **OS 12973** (paratype, ♂ LV: Pl. 14, 22, fig. 3), **OS 12974** (paratype, ♂ RV: Pl. 14, 24, fig. 2), **OS 12975** (paratype, ♂ car.: Pl. 14, 24, fig. 3). All from the type locality and horizon.

Explanation of Plate 14, 22

Fig. 1, ♀ LV, ext. lat. (holotype, **OS 12971**, 580µm long); fig. 2, ♀ RV, ext. lat. (paratype, **OS 12972**, 570µm long); fig. 3, ♂ LV, ext. lat. (paratype, **OS 12973**, 550µm long).

Scale A (100µm; ×130), figs. 1-3.

Diagnosis: A species of *Muellerina* characterised by small size, relatively thick shell, simple subovate outline in dorsal view, and delicate ornament consisting of numerous discrete circular to ovate fossae with several sharply defined narrow muri extending both above and below the muscle scar platform and into the anterior field of the valve.

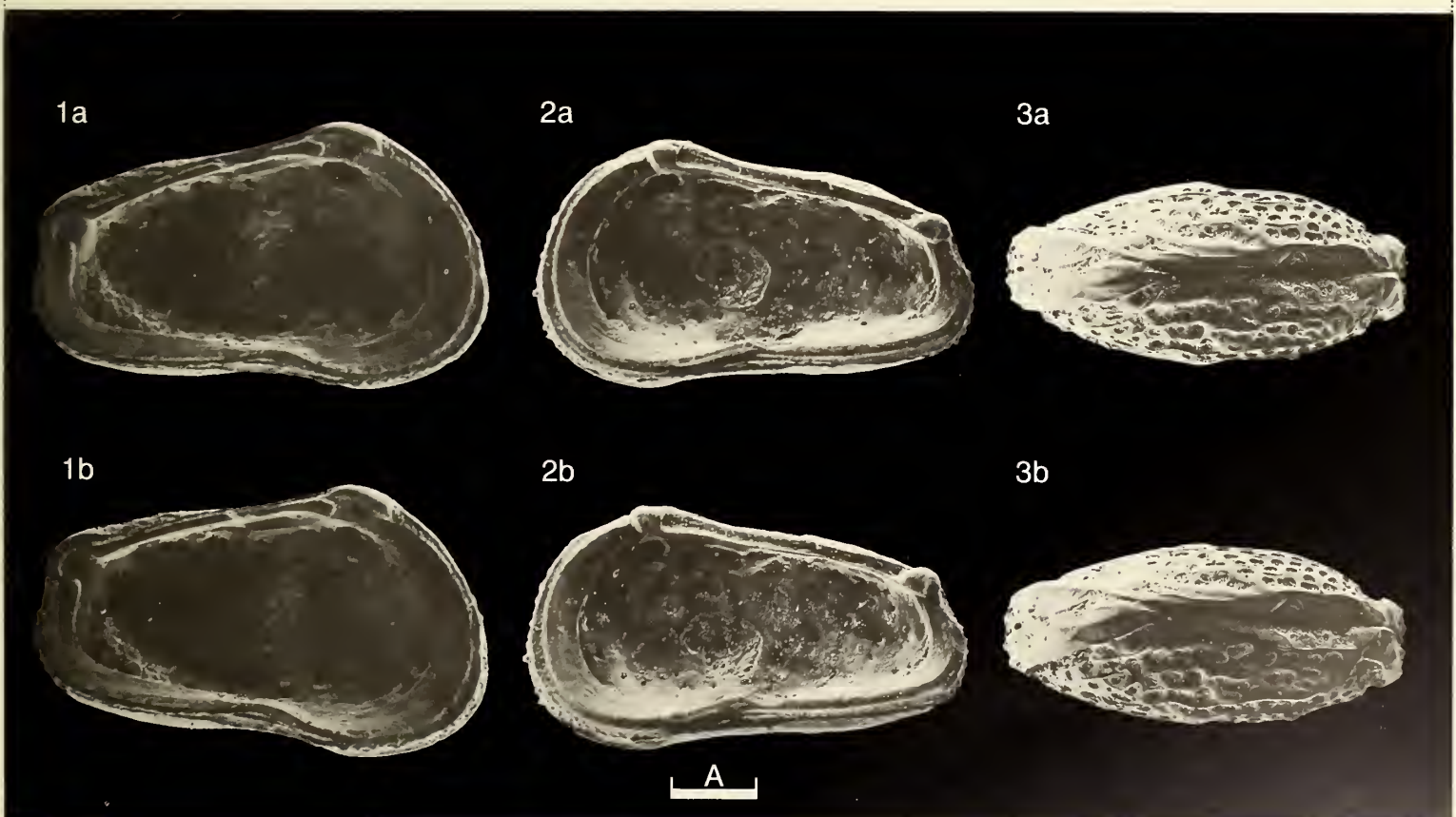
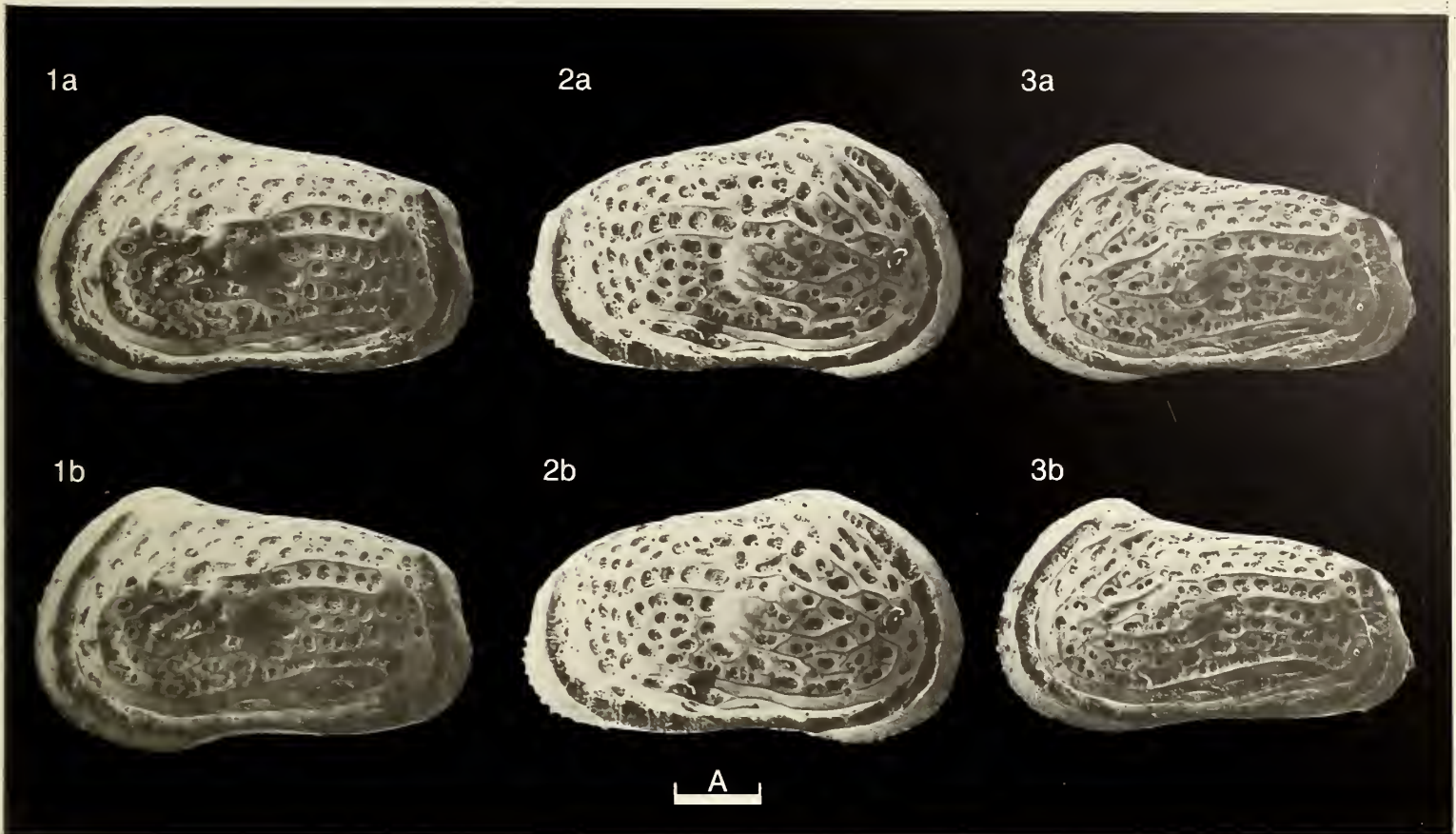
Remarks: *M. hazeli* most closely resembles *M. ohmert* Hazel, 1983, but is distinctly smaller, being equivalent in size to the A-1 instar of *M. ohmert*, and has a distinctive, more delicately developed ornament. *M. hazeli* rarely occurs sympatrically with *M. ohmert* north of Cape Hatteras (above 35°N), but is more abundant in deeper water on the upper continental slope, whereas *M. ohmert* is a typical shelf species, most common at depths between 25 and 175m (Hazel 1970). *M. hazeli* is both the smallest and the most southerly distributed extant species of *Muellerina*. It is believed to have evolved from its parent species, *M. ohmert*, during a high sea level stand in the late Pliocene (Cronin & Coles, in prep.), and has since undergone little morphological change.

Distribution: Recent of the Atlantic continental shelf and slope from the Florida Keys (24° 25'N) to off New York at the head of Lydonia Canyon (40° 30'N). *M. hazeli* lives on the outer shelf and upper slope, most commonly between 75 and 250m, having a maximum present-day depth range of 35 to 382m. It is also present in Pleistocene sediments in cores off the eastern United States from 32° 04'N to 38° 22'N, and in Pleistocene outcrops in the Norfolk and Wilmington submarine canyons.

Explanation of Plate 14, 24

Fig. 1, ♀ LV, int. lat. (holotype, **OS 12971**, 580µm long); fig. 2, ♂ RV, int. lat. (paratype, **OS 12974**, 530µm long); fig. 3, ♂ car., dorsal (paratype, **OS 12975**, 570µm long).

Scale A (100µm; ×130), figs. 1-3.



ON *HEALDIANELLA ? AREMORICA* CRASQUIN sp. nov.

by Sylvie Crasquin
(University of Lille, France)

Healdianella ? aremorica sp. nov.

Holotype: University of Lille; France, ostracode Collection (COUL) no. 860, ♂ carapace.
[Paratypes: COUL nos. 861, 862, 863, 865, 2155].

Type locality: Port Etroit Quarry (sample no. 85 MA 1), Laval syncline, Armorican Massif, France; lat. 47° 50' 54" N, long. 2° 39' 02"E. Sablé Limestone, uppermost Tournaisian, Carboniferous.

Derivation of name: From the latin *aremoricus*, Armorica, western province of Gaul.

Figured specimens: University of Lille, France, ostracode collection (COUL) nos. 860 (holotype, ♂ car.: Pl. 14, 26, fig. 1), 862 (♀ car.: Pl. 14, 26, fig. 2), 863 (♀ car.: Pl. 14, 26, fig. 3), 865 (♀ car.: Pl. 14, 28, fig. 1), 861 (juv. car.: Pl. 14, 28, fig. 2), 864 (juv. car.: Pl. 14, 28, fig. 3), 2155 (♂ car.: Pl. 14, 28, fig. 4). All from the Sablé Limestone of type locality; uppermost Tournaisian, lower Carboniferous.

Explanation of Plate 14, 26

Fig. 1, ♂ car., rt. lat. (holotype, COUL 860, 0.58 mm long); fig. 2, ♀ car., rt. lat. (paratype, COUL 862, 0.58 mm long); fig. 3, ♀ car., rt. lat. (paratype, COUL 863, 0.60 mm long).

Scale A (200 µm; × 140), fig. 1; scale B (200 µm; × 85), figs. 2, 3.

Diagnosis: Small, smooth species (adults 0.52-0.63 mm long) doubtfully assigned to *Healdianella*. Anterodorsal border straight; anterior border with a maximum of convexity located between 1/2 and lower 1/3 of valve height; ventral border is concave, with maximum concavity located in the anterior 1/3 of valve length; posterior border broadly rounded with maximum convexity located slightly below mid-height. In dorsal view, the carapace is laterally compressed in the medial region. Overlap is weak.

Sexual dimorphism: heteromorphs have a more obtuse dorsal angle in lateral view, and in dorsal view are wider behind a more pronounced median stricture. Tecnomorphs have a more acute dorsal angle in lateral view and in dorsal view are virtually of equal width throughout, the median stricture being poorly developed.

Remarks: This species looks like *Healdianella linevensis* Tschigova, 1958 from the upper Tournaisian of the Saratov-Leningrad area (*Trudy V.N.I.G.R.I.*, 14). *H. linevensis* differs in having a smaller length/height ratio, a more convex anterodorsal border and an anterior border which is not laterally compressed.

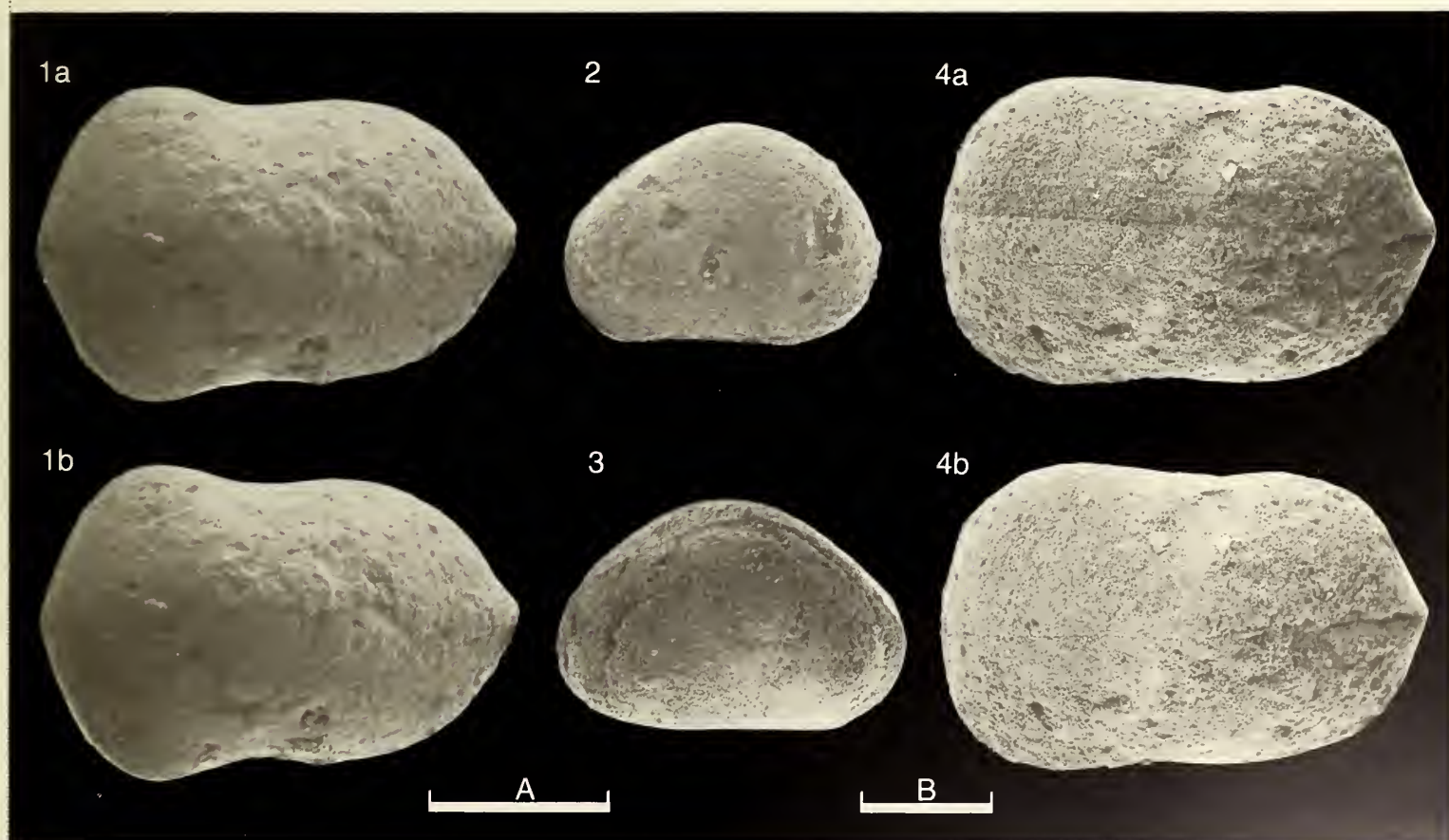
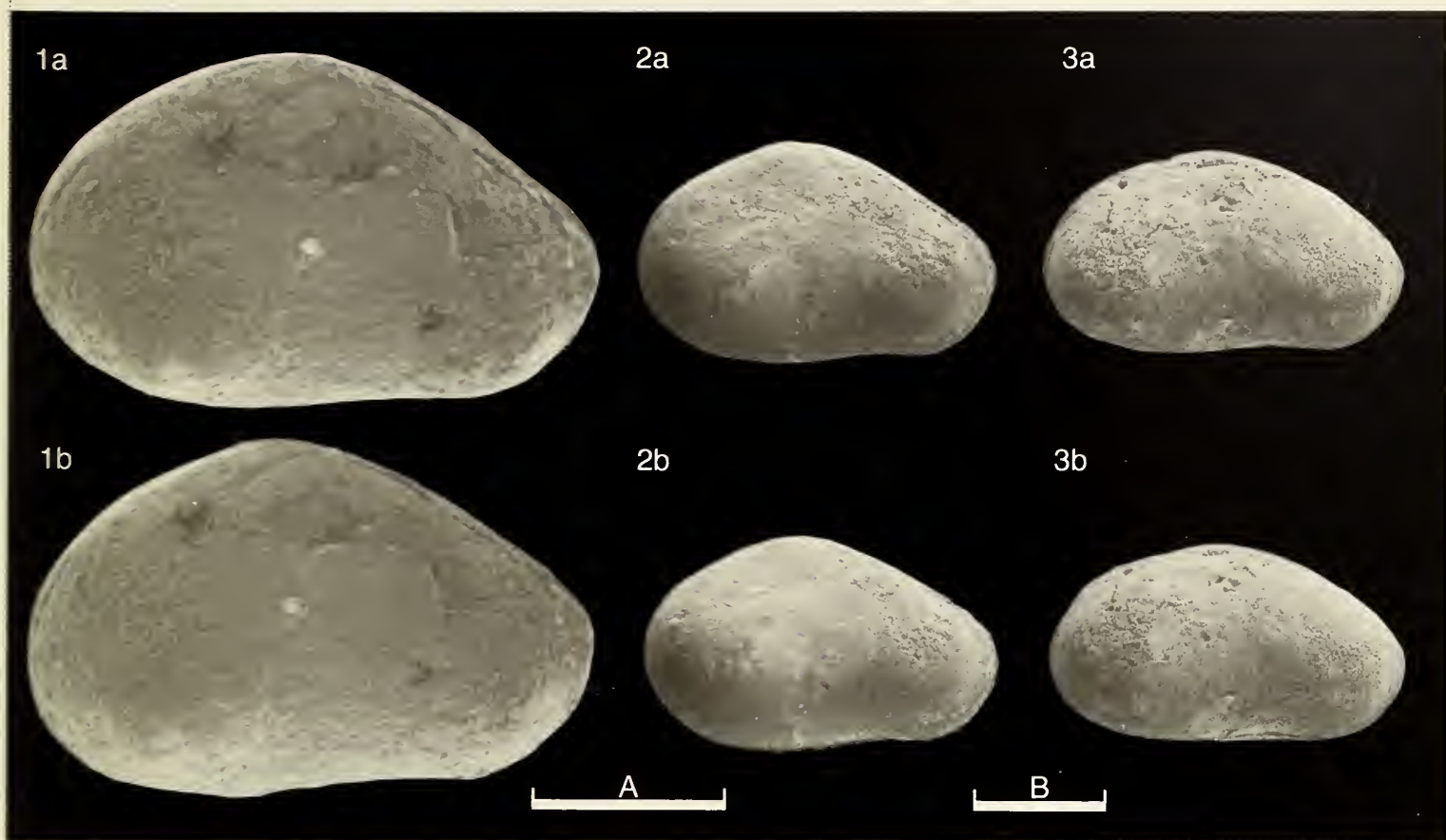
H. ? aremorica is assigned to *Healdianella* with doubt because in dorsal view its carapace is laterally compressed in the medial region, a characteristic not observed in other species of that genus.

Distribution: Laval syncline, Armorican Massif, France: uppermost Tournaisian-lower Viséan, lower Carboniferous.

Explanation of Plate 14, 28

Fig. 1, ♀ car., dors. (paratype, COUL 865, 0.58 mm); fig. 2, juv. car., lt. lat. (paratype, COUL 861, 0.47 mm long); fig. 3, juv. car., rt. lat. (paratype, COUL 864, 0.40 mm long); fig. 4, ♂ car., dors. (paratype, COUL 2155, 0.55 mm long).

Scale A (200 µm; × 125), figs. 1, 3, 4; scale B (200 µm; × 100), fig. 2.



ON *MAGHREBEIS TUBERCULATA* MAJORAN gen. et sp. nov.

by S. Majoran

(Department of Historical Geology and Palaeontology, University of Uppsala, Sweden)

Genus *MAGHREBEIS* gen. nov.

Type-species: *Maghrebeis tuberculata* sp. nov.

Derivation of name: From the North African province of Maghreb (including Morocco, Algeria and Tunisia).
Diagnosis: Carapace small, subtriangular, inequivalved. Left valve larger, overhanging posterior, ventral and anterior margins of right valve. Ventral margin convex, converging posteriorly with straight dorsal margin. Thick, swollen ridge runs along evenly rounded anterior margin, denticulated prominently only on right valve, seldom and only feebly on left valve. Caudal process triangular, pointed at mid-height and armed with a swollen ridge. Ornament polymorphic. Ventromedian and dorsomedian areas bear pronounced lobate tubercles. Lateral surface variously pitted, ventral surface with 4-5 fine longitudinal ribs. Hinge ear of left valve is large, forms a thick, hook-like protuberance that overlaps right valve. Circular eye tubercle and ovate adductor muscle tubercle prominent. Hinge amphidont/heterodont; right valve has large posterior tooth and strong anterior tooth with a large, spherical distal part fused to a smaller proximal part.

Remarks: Similar outline to *Veenia* Butler & Jones, 1957 and *Veeniacythereis* Gründel, 1973, which differ by being larger, having 3 longitudinal ridges and lacking the curved, left hinge ear of *Maghrebeis*. The left hinges of all three are similar, but the right hinge of *Maghrebeis* differs in having a modified anterior tooth. *Veenia* also differs by its usually more pointed caudal process, and *Veeniacythereis* by its feeble or absent subcentral tubercle.

Cythereis? sp. of Rosenfeld & Raab (*Bull. geol. Surv. Israel*, **62**, pl. 2, figs. 45-46, 1974; upper Cenomanian, Israel) probably belongs to *Maghrebeis* since it differs only by its smooth

Explanation of Plate 14, 30

Fig. 1, ♀? car., lt. lat. (holotype, PMAL1, 500µm long); fig. 2, ♀? car., dors., (PMAL2, 530µm long); fig. 3, ♀? RV, int. lat. (PMAL3, 500µm long); fig. 4, ♀? LV, int. lat., (PMAL4, 510µm long). Scale A (100µm; ×130), figs. 1-4.

Stereo-Atlas of Ostracod Shells 14, 31

Maghrebeis tuberculata (3 of 4)

Remarks: (cont.) surface and possibly having one less dorsal tubercle. Also possibly congeneric is *Cythereis lindiensis* Bate, 1969 as reported by Grosdidier (*Revue Inst. fr. Petrole.*, **28**, pl. 13, fig. 104, 1973), which appears to be slightly larger and has more irregular dorsomedian and ventromedian tuberculation, a less pronounced subcentral tubercle and a smooth surface. Further differences are revealed by the original description and re-illustrated type material of *C. lindiensis* (Bate & Mellish, *Stereo-Atlas Ostracod Shells*, **13**, 59-62, 1986). Another externally similar, considerably larger species is Grosdidier's *Cythereis* gr. *malzi* Bischoff, 1963 (*Revue Inst. fr. Petrole.*, **28**, pl. 14, fig. 105, 1973).

Maghrebeis tuberculata sp. nov.

Holotype: Palaeontological Museum, University of Uppsala, Sweden, no. PMAL1, ♀? carapace.

Type locality: Approx. 14km SW of Tocqueville, Algeria (approx. lat. 35° 52'N, long. 4° 55'E); Cenomanian.

Derivation of name: Latin, from the prominent dorsomedian and ventromedian tubercles.

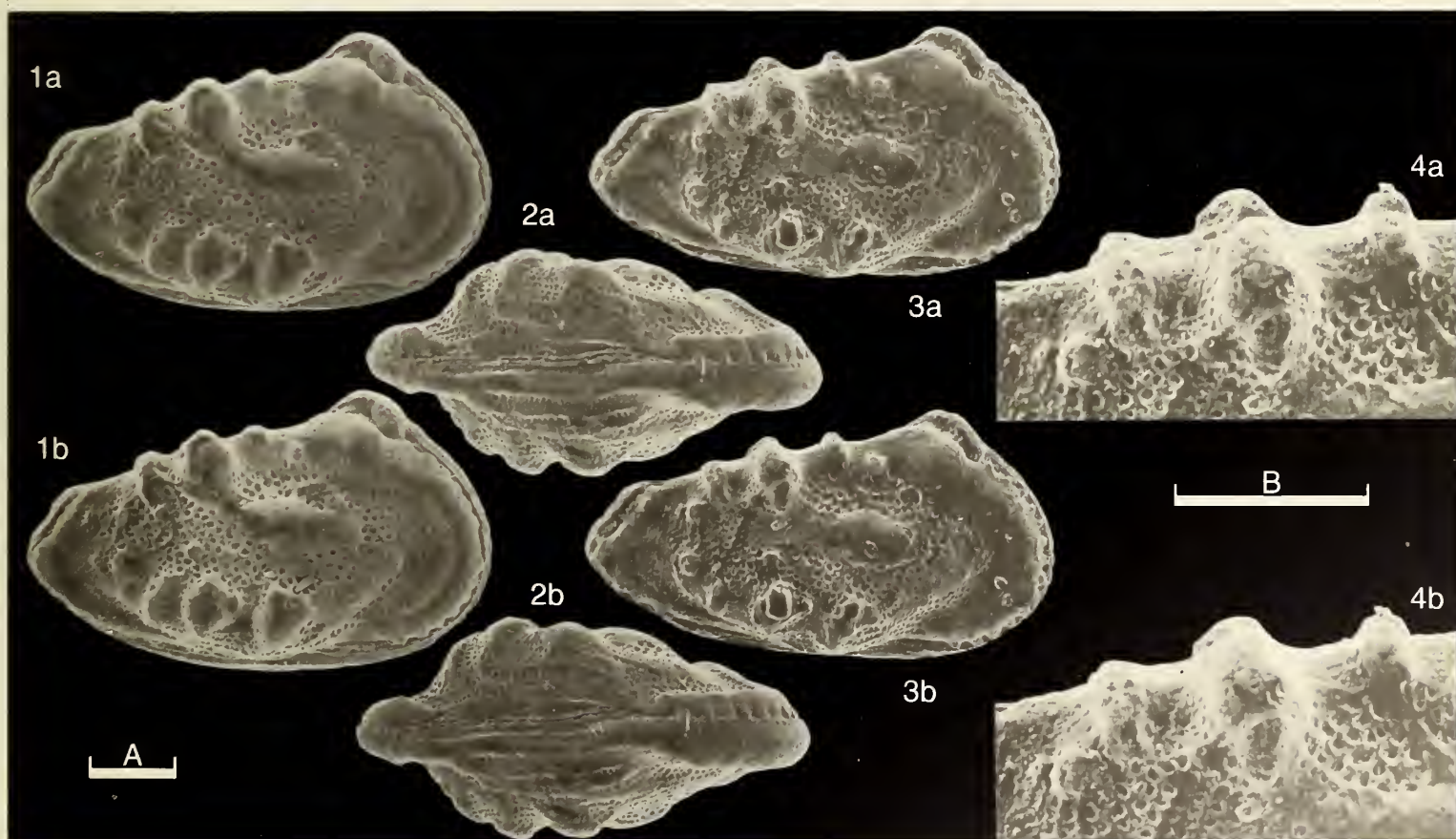
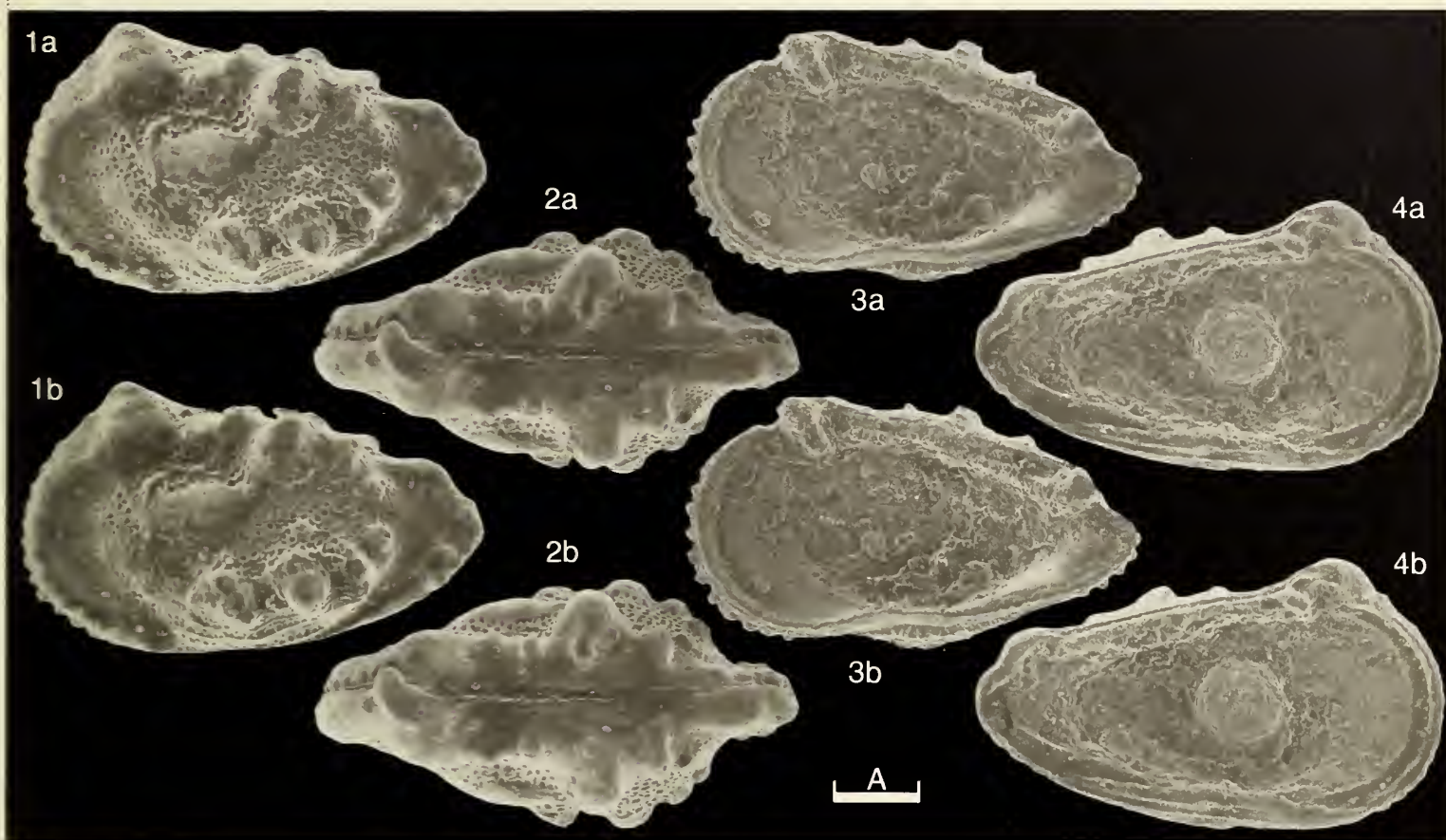
Figured specimens: Palaeontological Museum, University of Uppsala, Sweden, nos. PMAL1 (holotype, ♀? car.: Pl. 14, 30, fig. 1), PMAL2 (♀? car.: Pl. 14, 30, fig. 2), PMAL3 (♀? RV: Pl. 14, 30, fig. 3), PMAL4 (♀? LV: Pl. 14, 30, fig. 4), PMAL5 (♀? car.: Pl. 14, 32, fig. 2), PMAL6 (♀? car.: Pl. 14, 32, fig. 1), PMAL7 (♂? car.: Pl. 14, 32, figs. 3, 4). All from the type locality and horizon.

Diagnosis: *Maghrebeis* with fine network of small pits, and 3 smooth, lobe-like tubercles respectively on dorsomedian and ventromedian regions. Two additional, smaller tubercles vertically arranged on posteromedian area. Swollen anterior and posterior ridges, pronounced eye tubercle, and ovate, adductor muscle tubercle are all smooth as are also some narrow, longitudinal fields on ventral surface. Ornament polymorphic with respect to size and configuration of dorsomedian and ventromedian tubercles, strength of anterior and posterior ridges, and presence of denticles along ventral section of caudal process. Shape differences might reflect sexual dimorphism: one type being dorsoventrally and laterally more compressed (= ♂?).

Distribution: Uppermost Albian (or lower Cenomanian) to middle Cenomanian of N Africa.

Explanation of Plate 14, 32

Fig. 1, ♀? car., rt. lat. (PMAL 6, 500µm long); fig. 2, ♀? car., vent., showing pitted surface with smooth, narrow, longitudinal fields (PMAL5, 500µm long); figs. 3-4, ♂? car. (compressed morph), (PMAL7, 500µm long); fig. 3, car., rt. lat.; fig. 4, detail of dorsomedian tuberculation. Scale A (100µm; ×130), figs. 1-3; scale B (100µm; ×280), fig. 4.



ON *HOWEINA CAMPTOCYTHEROIDEA* HANAI

by Noriyuki Ikeya & Ellen Compton-Gooding
(Shizuoka University, Shizuoka, Japan & U.S. Geological Survey, Reston, VA)

Genus *HOWEINA* Hanai, 1957

Type-species (by original designation): *Howeina camptocytheroidea* Hanai, 1957

Diagnosis: Ovate Cytheruridae, right valve overlapping on dorsal margin, left valve overlapping on ventral margin. Greatest height anterior, ventral margin nearly straight with a slight alate projection, eye tubercle indistinct. Inner margin has modified S-shape along posterior margin.

Remarks: *Howeina* resembles *Semicytherura* Wagner, 1957 (see Whittaker, *Stereos-Atlas Ostracod Shells*, 2, 69-92, 1974); some might consider them synonymous since both have S-shaped posterior inner margins, but the validity of this criterion for recognising *Semicytherura* is questionable. In any case, right valves of *Howeina* have a large elongate anterior tooth, a knob-like posterior tooth and a smooth median element; in *Semicytherura* anterior and posterior teeth of the right valve are crenulate or have 2-3 knob-like projections, and the median element is smooth in the center with sockets at its ends.

Howeina camptocytheroidea Hanai, 1957

1957 *Howeina camptocytheroidea* sp. nov. T. Hanai, *J. Fac. Sci. Tokyo Univ.*, sec. 2, 11, 22-23, pl. 3, figs. 4a-c, text-figs. 5a, b.

1961 *Howeina camptocytheroidea* Hanai; T. Hanai, *ibid.*, 13, 358, text-fig. 2, figs. 5a, b.

1971 *Howeina camptocytheroidea* Hanai; K. Ishizaki, *Tohoku Univ. Sci. Rept.*, 2nd ser., (Geol.), 43, 79-80, pl. 2, fig. 21.

1977 *Howeina camptocytheroidea* Hanai; T. Hanai et al., *Bull. Univ. Mus. Tokyo*, 12, 56, pl. 3, figs. 1-7.

Explanation of Plate 14, 34

Fig. 1, ♂ LV, ext. lat. (IGSU-0-122, 618 µm long); fig. 2, ♂ car., ext. dors. (IGSU-0-126, 653 µm long); fig. 3, ♂ RV, ext. lat. (IGSU-0-123, 613 µm long); fig. 4, ♀ car., ext. vent. (IGSU-0-121, 605 µm long); fig. 5, ♀ RV, ext. lat. (IGSU-0-124, 625 µm long). Scale A (100 µm; × 100), figs. 1-5.

Stereos-Atlas of Ostracod Shells 14, 35

Howeina camptocytheroidea (3 of 4)

Holotype: University Museum, University of Tokyo, Tokyo, Japan, no. UMUT-CA-2612, ♀ right valve.
[Paratypes: nos. UMUT-CA-2613-2615].

Type locality: Upper Pliocene Setana Formation at Kaigarazawa, about 500m W of Nishinosawa, Kuromatsunai, Suttsu-gun, Hokkaido (lat. 42° 39' 37"N, long. 140° 17' 37"E).

Figured specimens: Institute of Geosciences, Shizuoka University (IGSU) nos. 0-121 (♀ car.: Pl. 14, 34, fig. 4), 0-122 (♂ LV: Pl. 14, 34, fig. 1), 0-123 (♂ RV: Pl. 14, 34, fig. 3; Pl. 14, 36, fig. 7), 0-124 (♀ RV: Pl. 14, 34, fig. 5; Pl. 14, 36, figs. 4-6), 0-125 (♀ LV: Pl. 14, 36, figs. 1-3), 0-126 (♂ car.: Pl. 14, 34, fig. 2). 0-121 is a Recent specimen from Mutsu Bay, northern Honshū (lat. 41° 20'N, long. 140° 55'E). 0-122-126 are from the type locality; 0-122, 123 are disarticulated valves of the same individual.

Diagnosis: The valve surface has a pattern of pits that run parallel along the posterior and dorsal margins and somewhat longitudinally in the center of the valve. The anterior and posterior areas have a pattern of irregular polygons delineated by fine ridges. The flat ventral margin has a series of ridges that run parallel to it. The posteroventral area is slightly depressed behind the alate projection.

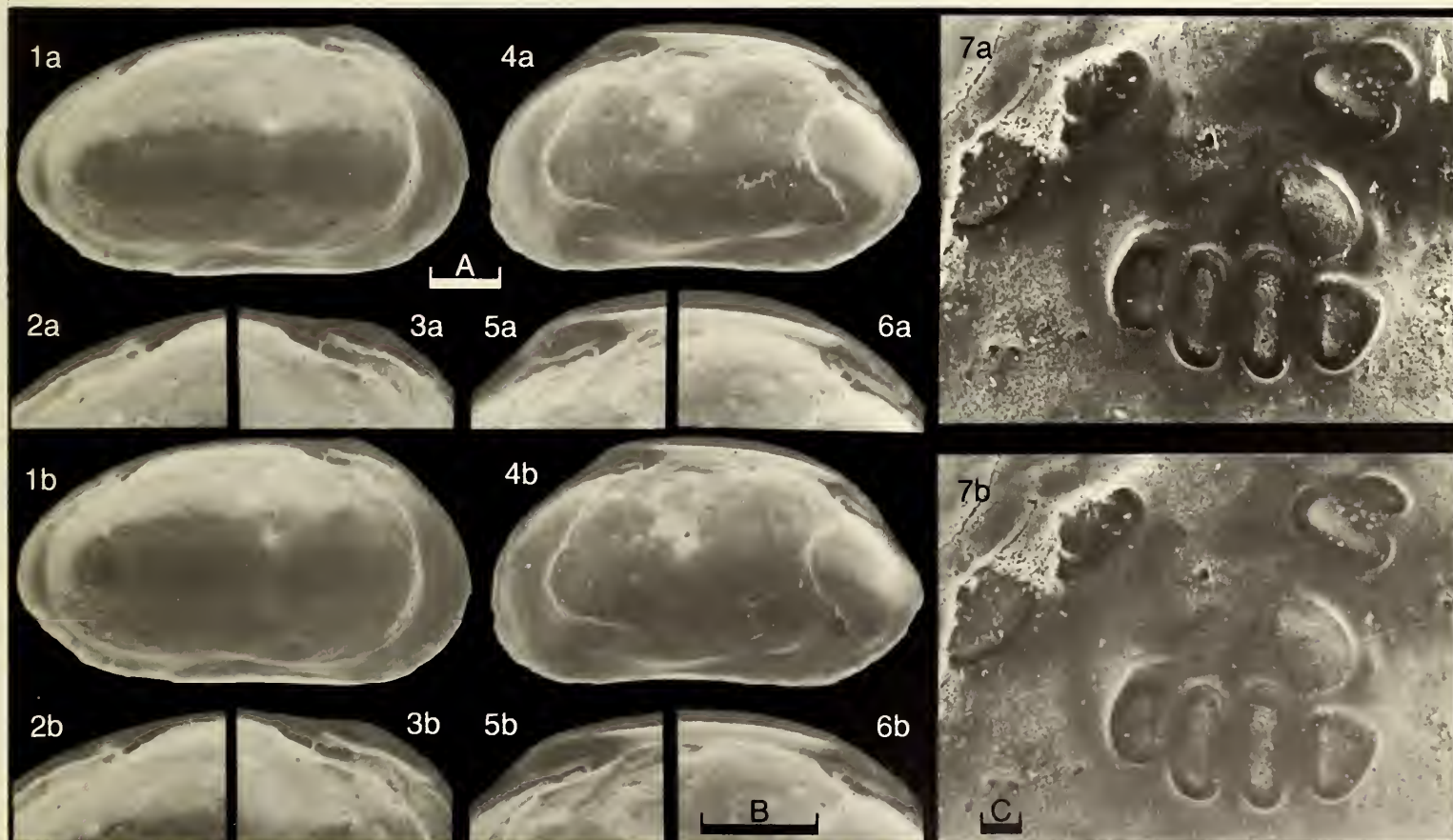
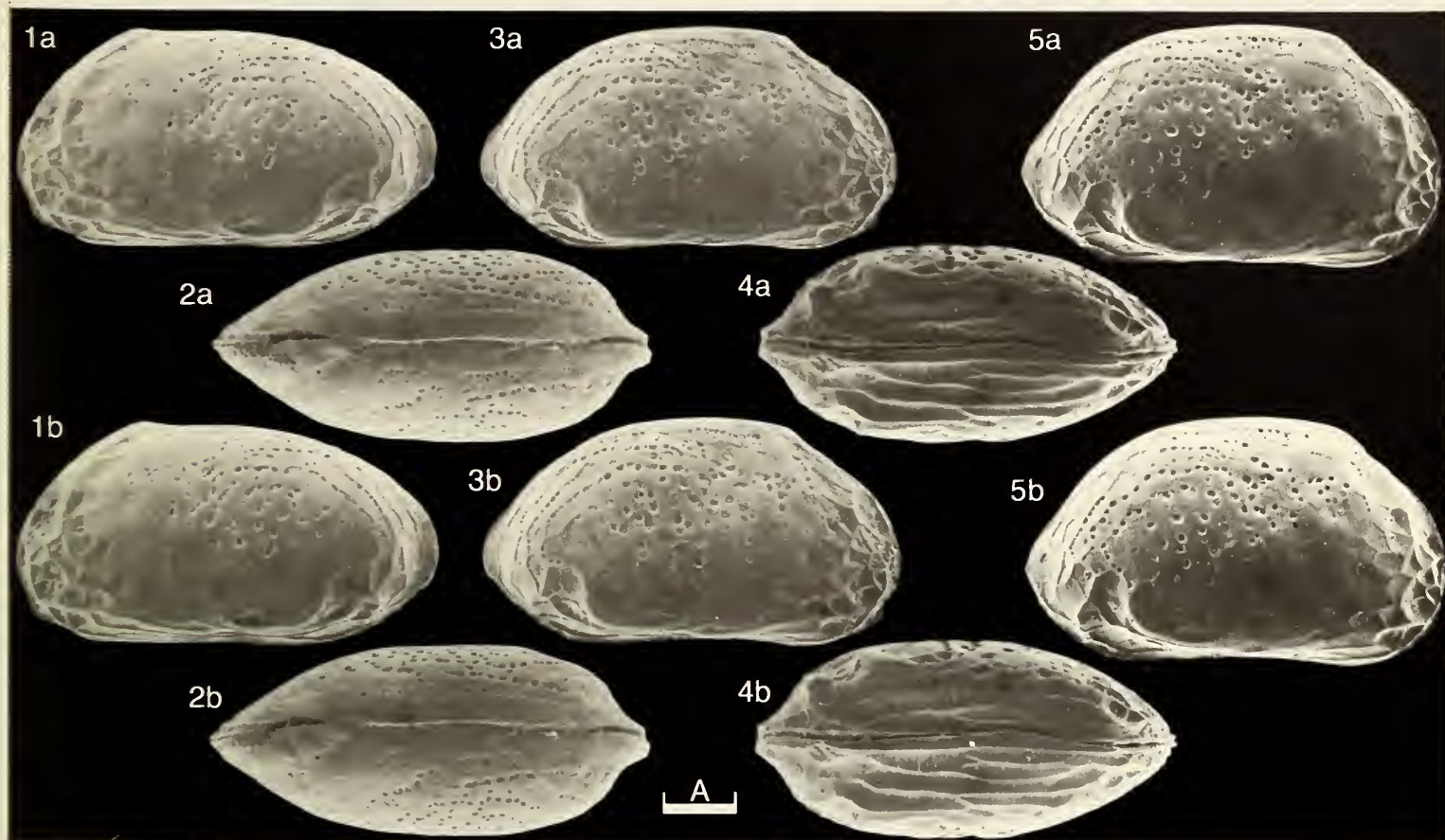
Remarks: *H. higashimeyaensis* Ishizaki, 1971, *H. leptocytheroidea* (Hanai, 1957), and *H. neoleptocytheroidea* (Ishizaki, 1966) each possess a distinctive pattern of prominent ridges and varying degrees of reticulation. They also have caudal processes that are more obvious than that of *H. camptocytheroidea*. Specimens illustrated by McDougall, Brouwers & Smith (*Bull. U.S. Geol. Surv.*, 1598, 56, pl. 10, figs. 1, 2, 1986) from Prudhoe Bay, Alaska, as *Cytherura* sp. B and *Cytherura* sp. C., appear to be very similar to *H. camptocytheroidea*.

Distribution: A cold water species, *H. camptocytheroidea* is currently living in Suttsu and Uchiura Bays, southern Hokkaido; Aomori and Mutsu Bays, Aomori Prefecture; and Otsuchi Bay, Iwate Prefecture. Late Pleistocene occurrences: the Nopporo Fm. Hokkaido; Shibikawa and Anden formations, Akita Prefecture; Hashidate Fm. Ishikawa Prefecture; and Jizodo, Yabu and Kiyokawa formations in Chiba Prefecture. In the late Pliocene, it occurs at the type locality; the Tomikawa Fm. Hokkaido; the Hamada Fm. Aomori Prefecture; and the Junicho Fm. Toyama Prefecture.

Explanation of Plate 14, 36

Fig. 1-3, ♀ LV (IGSU-0-125, 650 µm long): fig. 1, int. lat.; fig. 2, post. hinge; fig. 3, ant. hinge; figs. 4-6, ♀ RV (IGSU-0-124): fig. 4, int. lat.; fig. 5, ant. hinge; fig. 6, post. hinge; fig. 7, ♂ RV, int. musc. sc., dorsal is to right (IGSU-0-123).

Scale A (100 µm; × 100), figs. 1, 4; scale B (100 µm; × 160), figs. 2, 3, 5, 6; scale C (10 µm; × 540), fig. 7.



ON *SPINOLEBERIS EXIMIA* (BOSQUET)

by J. F. Babinot & J. P. Colin

(Université de Provence, Marseille and Esso Production Research-European Lab., Bègles, France)

Genus *SPINOLEBERIS* Deroo, 1966

Type-species: *Cythere eximia* Bosquet, 1854 (by original designation).

Diagnosis: Small-sized trachyleberidid (less than 650 μm) characterized by a well-marked hemispherical, sub-central tubercle; ventral ridge reduced to a strong posterior spinose tubercle and a median lamellar spine; strong spinose tubercle present at the postero-dorsal angle and a vertical spine on the middle part of the dorsal margin. A ridge connects the eye-tubercle and the sub-central tubercle; a weak longitudinal median ridge may be present; anterior margin bordered by two rows of strong spines. Surface of the valves smooth to very finely reticulate mostly on the anterior half. Sexual dimorphism distinct, males being longer than females. Amphidont hinge. Anterior marginal zone of medium width with about 20 straight pore canals. Muscle scars: three small scars disposed in a V-shape or a V-shaped scar with an additional round scar above the posterior branch; four adductor scars, the upper one being divided into two, the one below into three.

Remarks: The genus *Spinoleberis* is relatively common in the late Cretaceous of Western and Central Europe. Typical species are restricted to the Campanian-Maastrichtian. Cenomanian and Turonian species such as *S. petrocorica* (Damotte, *Rev. Micropal.*, **14**, 1, 1973), *S. krejci* Pokorný (*Acta Univ. Carolinae Geol.*, **4**, 1968) and *S. ectypus* Babinot (*Géobios*, **6**, 1, 1973) have a rather different morphology; they are deeply reticulate and do not display the characteristic spinose tubercles. Species attributed to the genus *Spinoleberis* by Donze (1970), have been recently placed in the newly erected genus *Navarracythere* Colin & Rodriguez-Lazaro (*Stereo-Atlas Ostracod Shells*, **13**, 63–66, 1986).

Explanation of Plate 14, 38

Fig. 1, ♀ car., ext. rt. lat. (20648–49, 560 μm long); fig. 2, ♂ LV, ext. lat. (20646–47, 550 μm long); fig. 3, ♂ RV, ext. lat. (20642–43, 560 μm long). Scale A (250 μm ; $\times 110$), figs. 1–3.

Spinoleberis eximia (Bosquet, 1854)

- 1854 *Cythere eximia* n. sp. J. Bosquet, *Verhandel. geol. beschr. kaart Nederland*, **2**, 106, pl. 7, figs. 6a–d.
- 1936 *Cythereis eximia* (Bosquet); J. E. van Veen, *Nat. hist. Maandbl.*, **25**, 11–12, **26**, pl. 7, figs. 1–6.
- 1958 *Cythereis eximia* (Bosquet); H. Howe & L. Laurencich, *Introduction to the study of Cretaceous Ostracoda*, 196–197.
- 1966 *Spinoleberis eximia* (Bosquet); G. Deroo, *Meded. geol. Sticht.*, **C**, **2**, 2, 165–166, pl. 6, figs. 72–74, pl. 26, figs. 822–824.
- 1966 *Cythereis eximia* (Bosquet); E. Herrig, *Paläont. Abh.*, **A**, **2**, 801–802, pl. 18, figs. 1–10, pl. 19, fig. 1.
- 1983 *Spinoleberis eximia* (Bosquet); B. Clarke, *Mitt. Geol.-Paläont. Inst. Univ. Hamburg*, **54**, 110–111, pl. 7, figs. 11–12.

Holotype: Material deposited in the collections of the Institut Royal des Sciences Naturelles de Belgique, Brussels under the reference “Crétacé Ostracodes 87 Arthr. Sec. I, Cret.”, slide no. 44.

Type locality: Late Maastrichtian of St. Pietersburg, near Maastricht, southern Limburg, the Netherlands.

Figured specimens: These are deposited in the collections of Esso Production Research – European Laboratories at Bègles, France and the numbers all carry the prefix EPR–E. **EPR–E 20648–49** (♀ car.: Pl. 14, 38, fig. 1), **20646–47** (♂ LV: Pl. 14, 38, fig. 2), **20642–43** (♂ RV: Pl. 14, 38, fig. 3), **20650–51** (♀ LV: Pl. 14, 40, fig. 1), **20654–55** (♂ car.: Pl. 14, 40, fig. 2), **20816–17** (♀ RV: Pl. 14, 40, fig. 3). All figured specimens are from Puits Maurits (250.5m), Maastricht, southern Limburg, The Netherlands; late Maastrichtian.

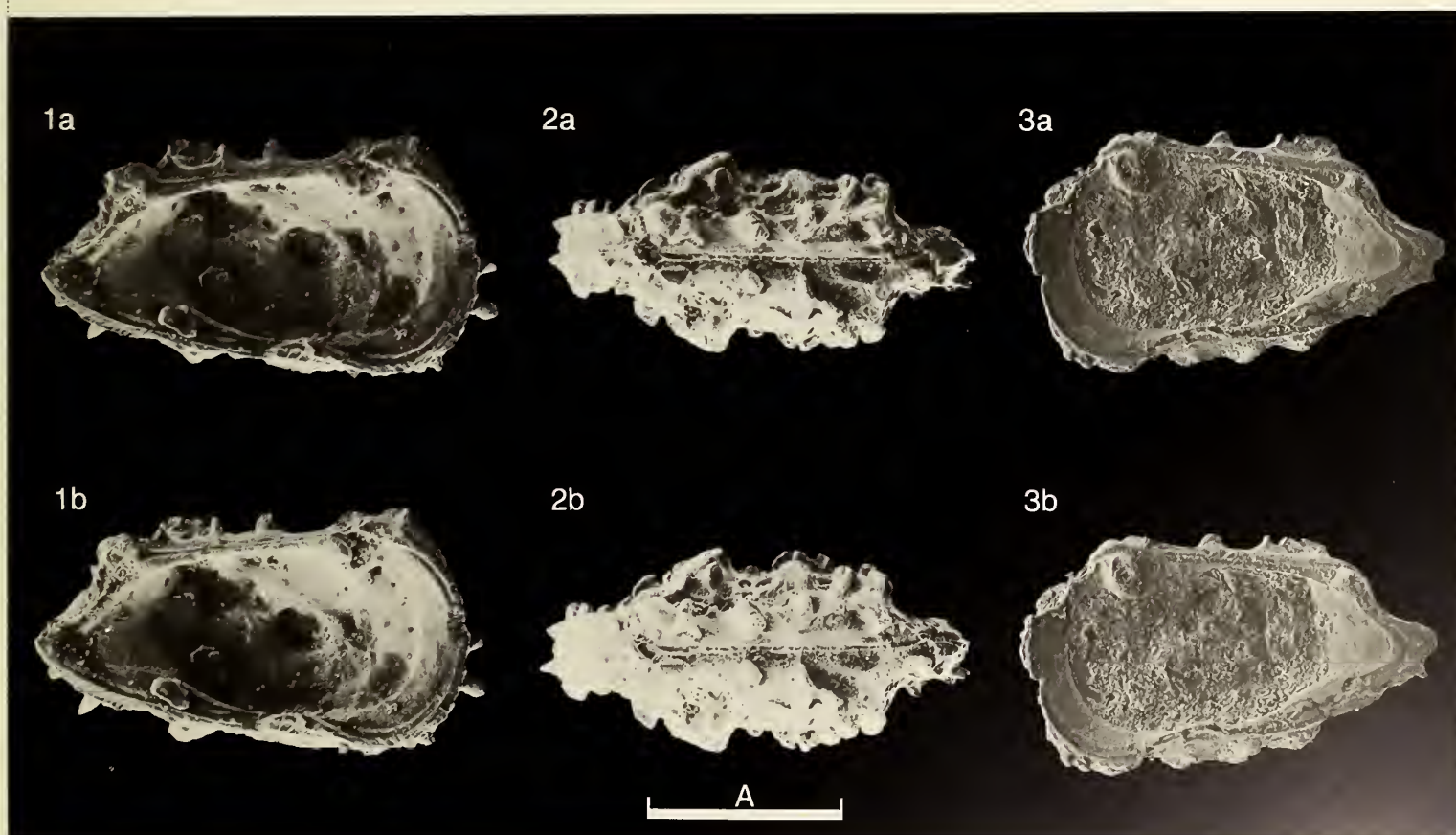
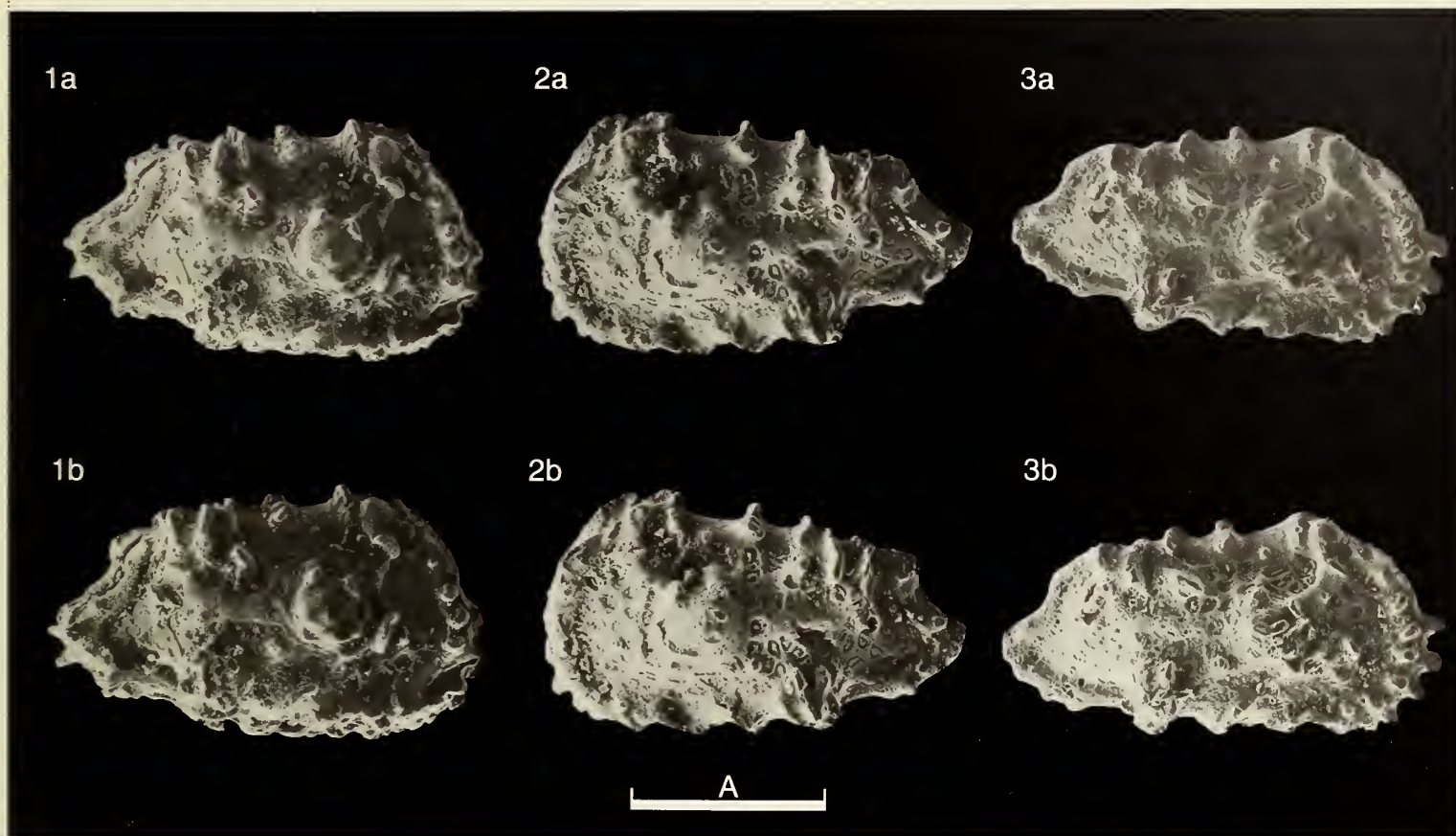
Diagnosis: As for the genus. The surface of the muri of the reticulation is very finely pitted. A little knob occurs in the middle of each mesh.

Remarks: Deroo (1966), illustrated several species of the genus *Spinoleberis* in the type Maastrichtian. Most of the species are very similar to *S. eximia* and therefore extremely difficult to differentiate. Whether they are different species or merely ecotypes is highly questionable. These are *S. eximioides* (van Veen) and *S. pseudoeximia* Deroo. *Cythereis symmetrica* van Veen, 1936 (*Nat. Hist. Maandbl.*, **25**, 11–12) is considered by Deroo (1966) and Clarke (1983) to be a juvenile of *S. eximia*, by Howe & Laurencich (1958), (1965) to belong in *S. tuberosa* (Jones & Hinde) and by Szczechura (1965) to belong in *S. spinifera* (van Veen).

Distribution: Late Maastrichtian of the Netherlands and Belgium. Early to late Maastrichtian of Germany.

Explanation of Plate 14, 40

Fig. 1, ♀ LV, int. lat. (20650–51, 575 μm long); fig. 2, ♂ car., ext. dors. (20654–55, 555 μm long); fig. 3, ♀ RV, int. lat. (20816–17, 545 μm long). Scale A (250 μm ; $\times 110$), figs. 1–3.



ON KOVALEVSKIELLA CAUDATA (LUTZ)

by P. Carbonel, J.-P. Colin & L. Londeix
(University of Bordeaux, Talence & Esso Production Research, Bègles, France)

Kovalevskiella caudata (Lutz, 1965)

1965 *Gomphocythere caudata* sp. nov. A. K. Lutz, *Geol. Jahrb.*, **82**, 311, text-fig. 27, pl. 13, figs. 1, 2.

1969 *Cordocythere caudata* (Lutz); G. Carbonnel & S. Ritzkowski, *Arch. Sci. (Genève)*, **22**(1), 60.

1980 *Kovalevskiella caudata* (Lutz); J.-P. Colin & D. Danielopol, *Paleobiol. continent.*, **11**(1), 32, 37, fig. 17.

1985 *Kovalevskiella caudata* (Lutz); P. Carbonel, *Bull. Centres. Rech. Explor.-Prod. Elf-Aquitaine, Mém.* **9**, pl. 90, figs. 7-10.

1986 *Kovalevskiella caudata* (Lutz); P. Carbonel, J.-P. Colin, D. L. Danielopol & L. Londeix, *Géobios*, **19**(6), pl. 1, figs. 4-7.

Holotype: Bundesanstalt für Bodenforschung, Hanover, no. **5421**, LV. [Paratype: no. **5420**, LV]

Type locality: Road cut between Undorf and Nittendorf near Regensburg, Bavaria, Federal Republic of Germany; Tortonian, Late Miocene; freshwater molasse.

Figured specimens: Dept. Geol. & Oceanography, Univ. Bordeaux I, CO nos. **5103** (LV: Pl. **14**, 42, figs. 1-3; Pl. **14**, 44, fig. 1), **5104** (RV: Pl. **14**, 42, figs. 4-6), **5105** (car.: Pl. **14**, 44, figs. 4, 5), **5106** (LV juv.: Pl. **14**, 44, fig. 2), **5107** (RV juv.: Pl. **14**, 44, fig. 3), **5108** (LV juv.: Pl. **14**, 44, fig. 6). Aquitanian, Miocene, of Le Moras, near Labrède, Gironde, France; lat. 44° 41'N, long. 0° 34'W. Original, German material could not be photographed.

Diagnosis: Carapace subrectangular, rounded anterior and posterior extremities; ornament typical of genus: regularly disposed pustules. Well developed sulcus; large brood pouch. RV larger than LV; both cardinal hinge elements on LV trilobate. No sexual dimorphism. Two strong denticles on the posteroventral part of LV.

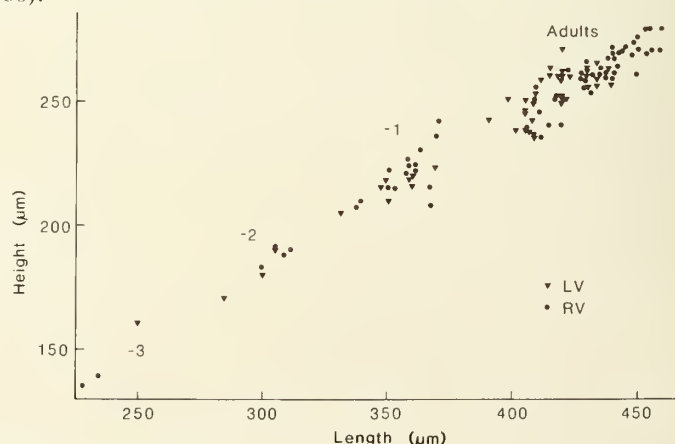
Explanation of Plate 14, 42

Figs. 1-3, LV (CO 5103, 430µm long); fig. 1, ext. lat.; fig. 2, int. lat. hinge; fig. 3, int. lat. Figs. 4-6, RV (CO 5104, 433µm long); fig. 4, int. lat.; fig. 5, ext. lat.; fig. 6, int. lat. hinge. Scale A (200µm; ×135), figs. 1, 3-5; scale B (200µm; ×205), figs. 2, 6.

Remarks: Like other *Kovalevskiella*, *K. caudata* is parthenogenetic. It differs by the presence of 2 strong denticles on the posteroventral part of the left valve. Denticles are also present in larval stages, but only in the right valve. In the French locality studied, this species lived in a lagoonal to lacustrine environment (in oligo- to mesohaline waters) on very fine grained, marl bottom sediment. *K. caudata* is associated with *Neocyprideis aquitanica* Moyes or with *Candonopsis* and *Limnocythere*, and always with poorly diversified faunas. When the waters become fresh and more stable, *Kovalevskiella* disappears. Lutz (1965) described *K. caudata* from coaly marls in a freshwater molasse deposit. Its epibenthic life-style is very different to the hypogean or interstitial habitats of Recent *Kovalevskiella* (Colin & Danielopol 1980; Carbonel *et al.*, 1986).

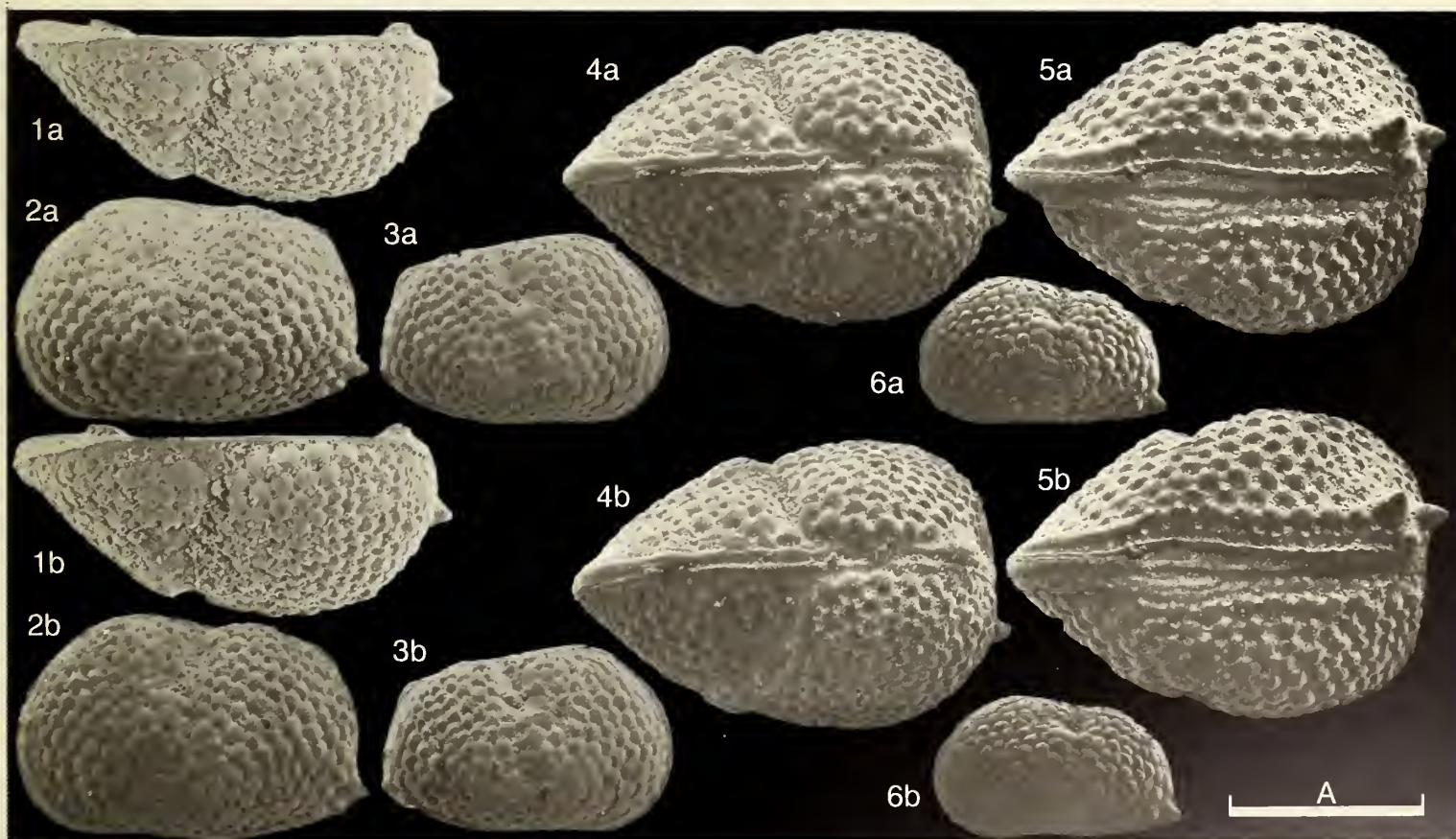
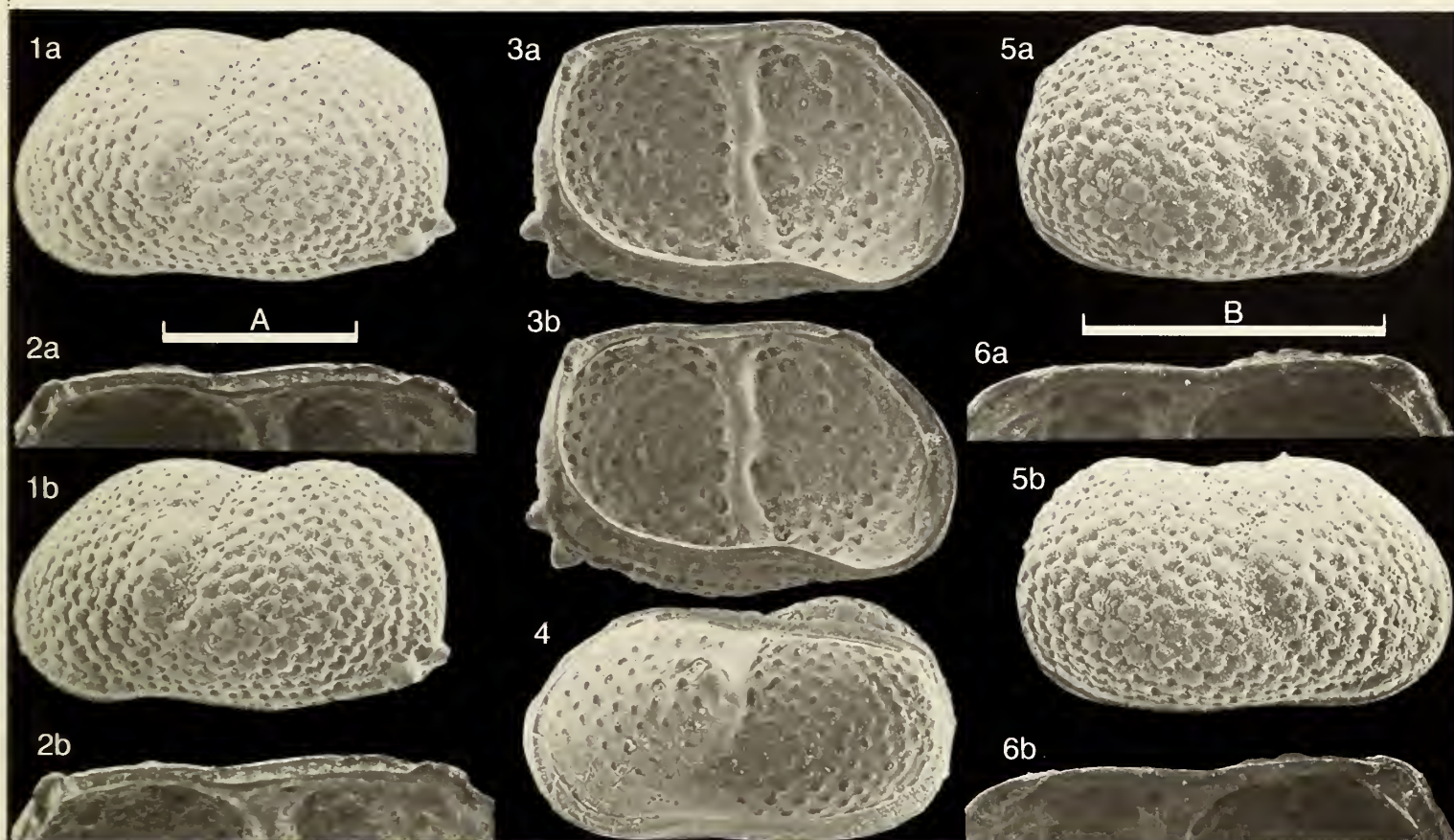
Distribution: Miocene (Tortonian) near Regensburg, Germany (Lutz 1965); Miocene (Aquitanian) near Bordeaux, France (Carbonel 1985; Carbonel *et al.* 1986).

Text-fig. 1. Size dispersion of 116 left and right valves of *K. caudata* from Le Moras, near Labrède, Gironde, SW France.



Explanation of Plate 14, 44

Fig. 1, LV ext. dors. (CO 5103, 430µm long); fig. 2, LV juv.-1, ext. lat. (CO 5106, 340µm long); fig. 3, RV juv.-2, ext. lat. (CO 5107, 285µm long). Figs. 4, 5, car. (CO 5105, 420µm long): fig. 4, ext. dors.; fig. 5, ext. vent. Fig. 6, LV juv.-3, ext. lat. (CO 5108, 215µm long). Scale A (200µm; ×135), figs. 1-6.



ON *CALOCARIA MAURAE* VANNIER gen. et sp. nov.

by Jean Vannier
(University of Rennes, France)

Genus *CALOCARIA* gen. nov.

Type-species: *Calocaria maurae* sp. nov.

Derivation of name: From the Greek *karia*, a walnut and *kalos*, beautiful; alluding to the shell shape and lateral ornament. Gender feminine.

Diagnosis: Myodocopid ostracode, oval in outline. Length 3.5mm; adults have a length:height ratio of approximately 1.1. Prominent anterior rostrum and rostral incisure. Composite external ornament: pattern of coarse ridges running obliquely to the ventral and dorsal margins, converging towards the middle of the valve and connected ventrally to a continuous marginal ridge; posteriorly to mid-length, ornament consists of a linear alignment of more and less coalescent tubercles laterally merging with corrugations. Small arcuate muscle scar impression.

Remarks: This new genus shares many similarities (rostrum, simple muscle scar impression, oval outline) with other Silurian 'cypridinids' and is tentatively included within this group. Nevertheless, the composite ornament of *Calocaria* is comparable to that of Silurian 'bolbozoids' (see Siveter, Vannier & Palmer, *Palaeontology*, text-fig. 4, *in press*, 1987) but neither the distinctive anterodorsal bulb nor sulcus typical of that group occur in *Calocaria*. By its well developed ornament *Calocaria* is distinguished from any other Silurian 'cypridinids', which are mainly smooth (see Siveter, Vannier & Palmer, *Palaeontology*, pls. 2, 3, 5, *in press*, 1987). As with numerous myodocopids from the Silurian of Europe, most specimens of *Calocaria maurae* show 'plastic' deformation of the valves, suggesting a rather thin, flimsy shell.

Explanation of Plate 14, 46

Figs. 1-3, RV (holotype, **IGR 33100**, 3055µm long): fig. 1, ext. lat.; fig. 2, ext. vent. obl.; fig. 3, ornament of lateral surface. Scale A (750µm; ×18), figs. 1, 2; scale B (100µm; ×75), fig. 3.

Calocaria maurae sp. nov.

Holotype: Institut de Géologie, University of Rennes (**IGR**), France, coll. no. **33100**; RV.

[Paratypes: **IGR** coll. nos. **33101**, LV; **33103**, RV; **33104**, LV; **33106**, LV].

Type-locality: Siltstones and mudstones in the Talmakent section near Talmakent (sample TA 84452 of J. J. Cornée collections, University of Aix-Marseille, France), Haut-Atlas, Morocco; lat. 31° 52'N, long. 7° 45'W. Upper part of the Silurian; as determined by J. J. Cornée (work in progress).

Derivation of name: From *maura*, Moorish, alluding to the region where this species occurs.

Figured specimens: Inst. de Géologie, Univ. Rennes (**IGR**), coll. nos. **33100** (holotype, RV: Pl. 14, 46, figs. 1-3; Pl. 14, 48, figs. 1, 2) and **33101** (paratype, LV: Pl. 14, 48, figs. 3-6). From type locality; latex casts.

Diagnosis: As for the genus. Monotypic.

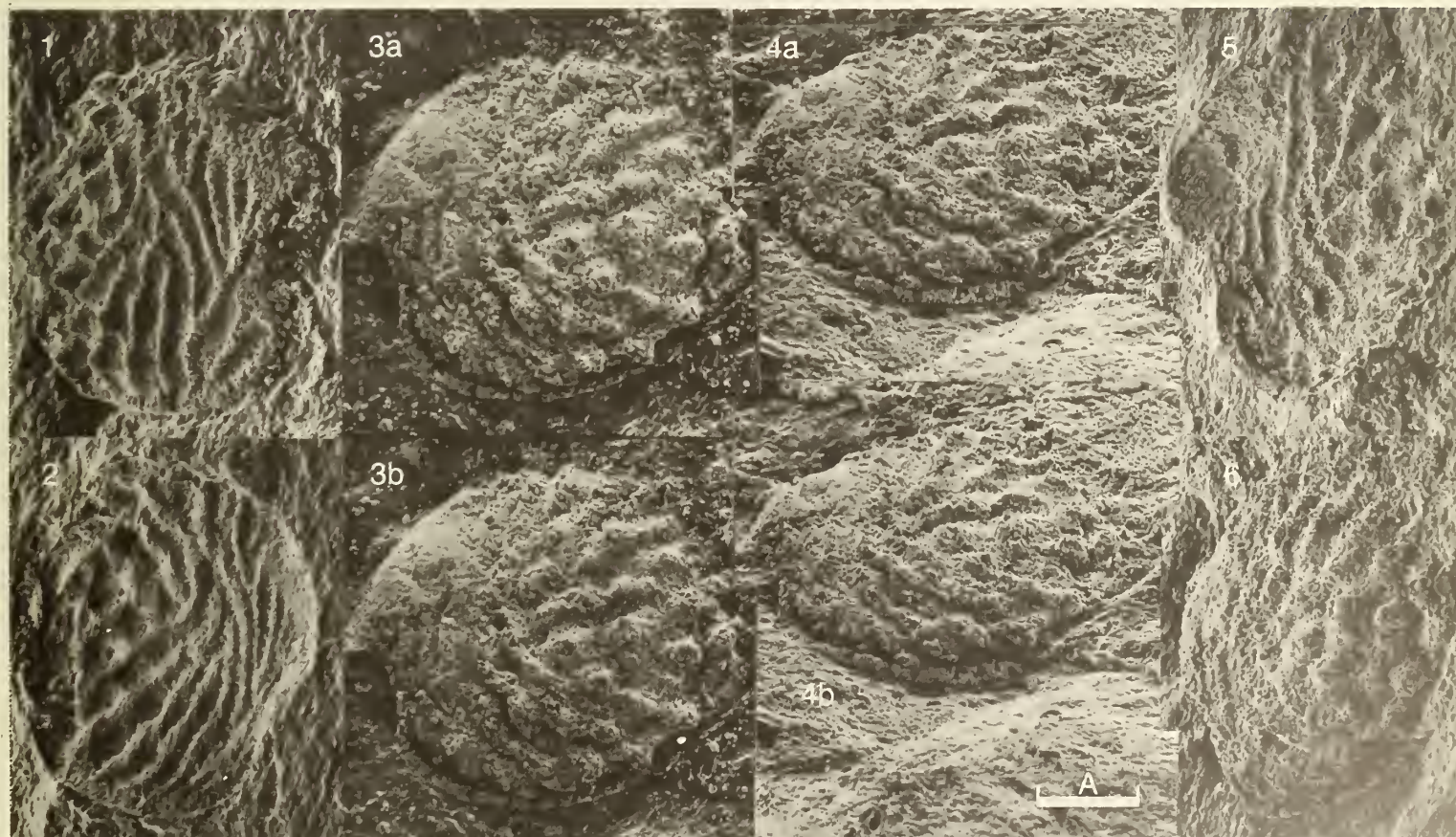
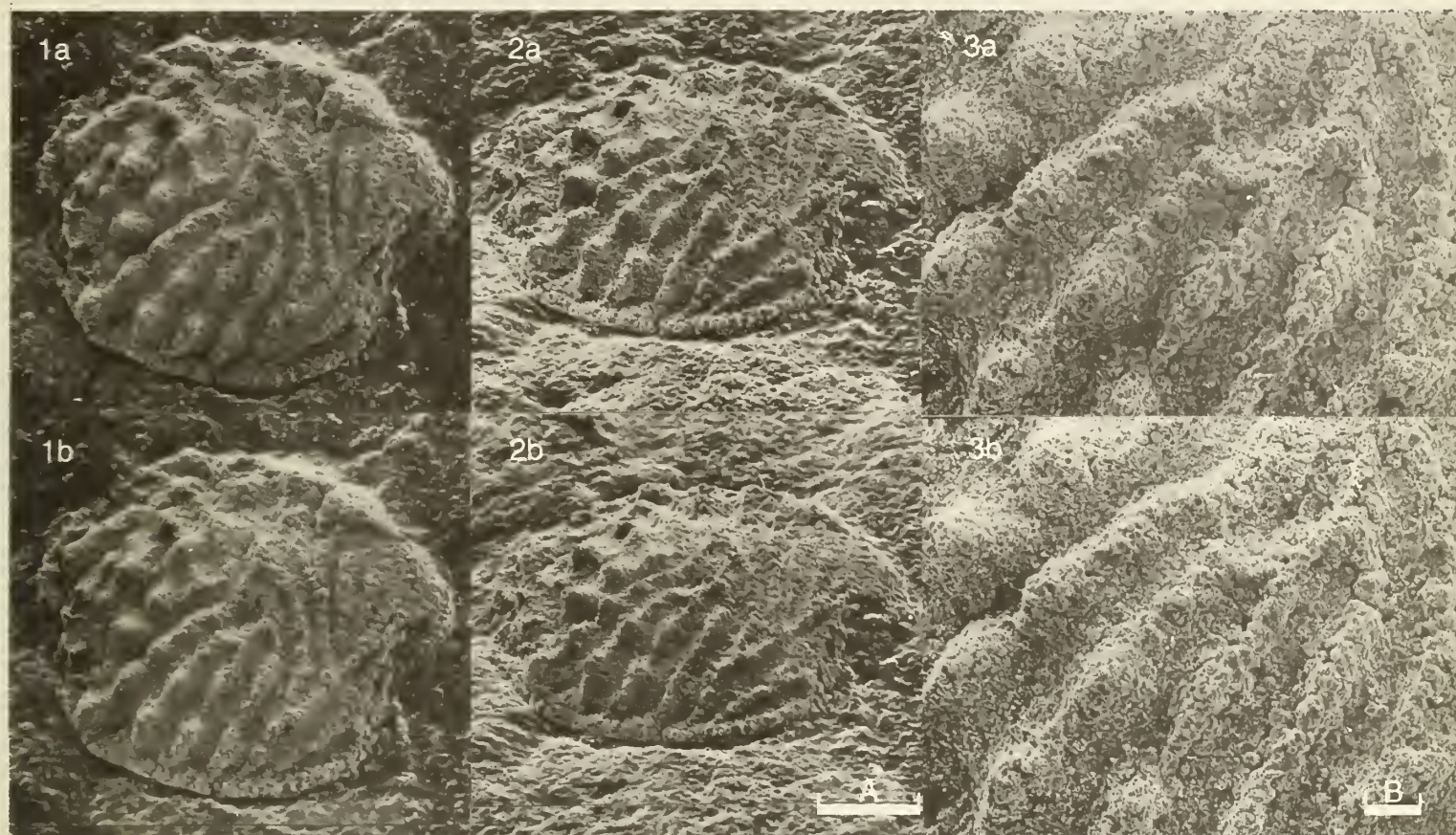
Remarks: *C. maurae* is the first Silurian myodocopid to be described from Africa. In the type locality, it is associated with numerous other myodocopid ostracodes, both 'bolbozoids' and 'cypridinids'. In this respect, this fauna is comparable to that recently documented from organic-rich, Silurian sediments of Britain and France (Siveter, *et al.*, *op. cit.*, *in press*). As a prelude to their further systematic studies of Silurian myodocopids the latter authors have noted the occurrence of similar myodocopid faunas in the same type of deposits (black to terrigenous mudstones) from northwestern Europe (e.g. Ludlow Series in Wales and the Armorican Massif, France), eastern Europe (Ludlow Series of Bohemia, Czechoslovakia) and now North Africa (herein). An outer shelf to shelf margin or even shelf slope environment is inferred, from faunal and sedimentological evidence, for the myodocopid occurrences in Europe (see Siveter, *et al.*, *op. cit.*, *in press*) and is also likely in the case of the Moroccan material.

Distribution: At present, known only from the type locality.

Acknowledgements: To J. J. Cornée (University of Aix-Marseille) for allowing me to study his material and to the Humboldt Foundation (Bonn) for my Research Fellowship at Hamburg University.

Explanation of Plate 14, 48

Figs. 1, 2, RV (holotype, **IGR 33100**, 3055µm long): fig. 1, ext. ant. obl.; fig. 2, ext. post. obl. Figs. 3-6, LV (**IGR 33101**, 3050µm long): fig. 3, ext. lat.; fig. 4, ext. vent. obl.; fig. 5, ext. ant. obl.; fig. 6, ext. post. obl. Scale A (750µm; ×18), figs. 1-6.



ON *SPINOHIPPULA ESURIALIS* VANNIER, KRŮTA & MAREK gen. et sp.
nov.

by Jean Vannier, Miroslav Krůta & Ladislav Marek
(University of Rennes, France; Academy of Sciences, Prague, Czechoslovakia)

Genus *SPINOHIPPULA* gen. nov.

Type-species: *Spinohippula esurialis* sp. nov.

- Derivation of name:** Alluding to velar spines and resemblance with species of the tribe Hippulini. Gender feminine.
- Diagnosis:** Medium sized glossomorphitine (adults < 1.2mm long). Lateral surface virtually lacks lobation: sulci only expressed dorsally as two very poorly marked depressions, presumably representing S2 and S3. Strong velum extending from near anterior cardinal corner to posteromedium or posterodorsal part of valve and bearing a distinctive coarse denticulation along inner margin bordering a deep (maximum depth ventrally and anteriorly) fissum-like laterovelar furrow. Dimorphism mainly expressed in females by a broad crescent-like velar flange and a wide concave subvelar area (dolonal antrum) both ends of which connect with lateral surface of valve. Inner velar spines converging towards middle of domicilium tend to reach the lateral surface over the laterovelar furrow. Tecnomorphs have narrower velum reduced to a row of radiating velar spines, with laterovelar furrow more open than in females; marginal sculpture unknown.
- Remarks:** The inclusion of *Spinohippula* within the Glossomorphitinae (see R. Schallreuter, *Palaeontographica A*, **180**, 1983) is justified by the occurrence of a strong velar sculpture in both females and tecnomorphs, and well marked velar dimorphism. The shape of the velar flange in females is its most significant glossomorphitine feature, consisting of a massive adventral sculpture (Pl. **14**, 52, fig. 2) high the domicilium. Comparable features are in typical glossomorphitines such as *Collibolbina collis collis* (Schallreuter, 1964) (see R.

Explanation of Plate 14, 50

Figs. 1-4, ♀ LV (holotype, NM L26073, 1188µm long): fig. 1, ext. lat.; fig. 2, ext. vent. obl. (tilted 75°); fig. 3, ext. dors. obl. (tilted 45°), antero-vent. part of the valve. Scale A (300µm; ×69), figs. 1-3; scale B (200µm; ×115), fig. 4.

Stereo-Atlas of Ostracod Shells 14, 51

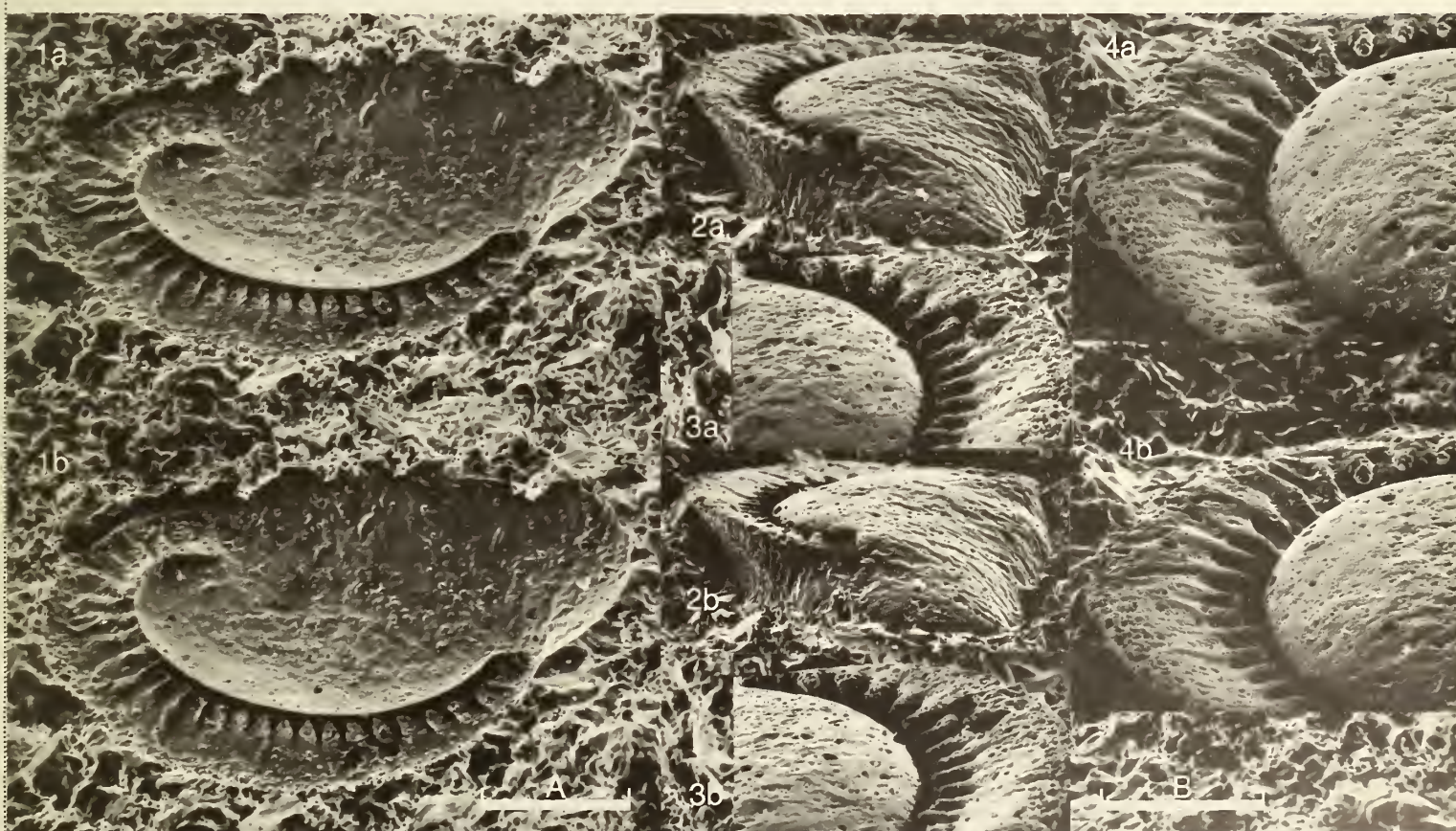
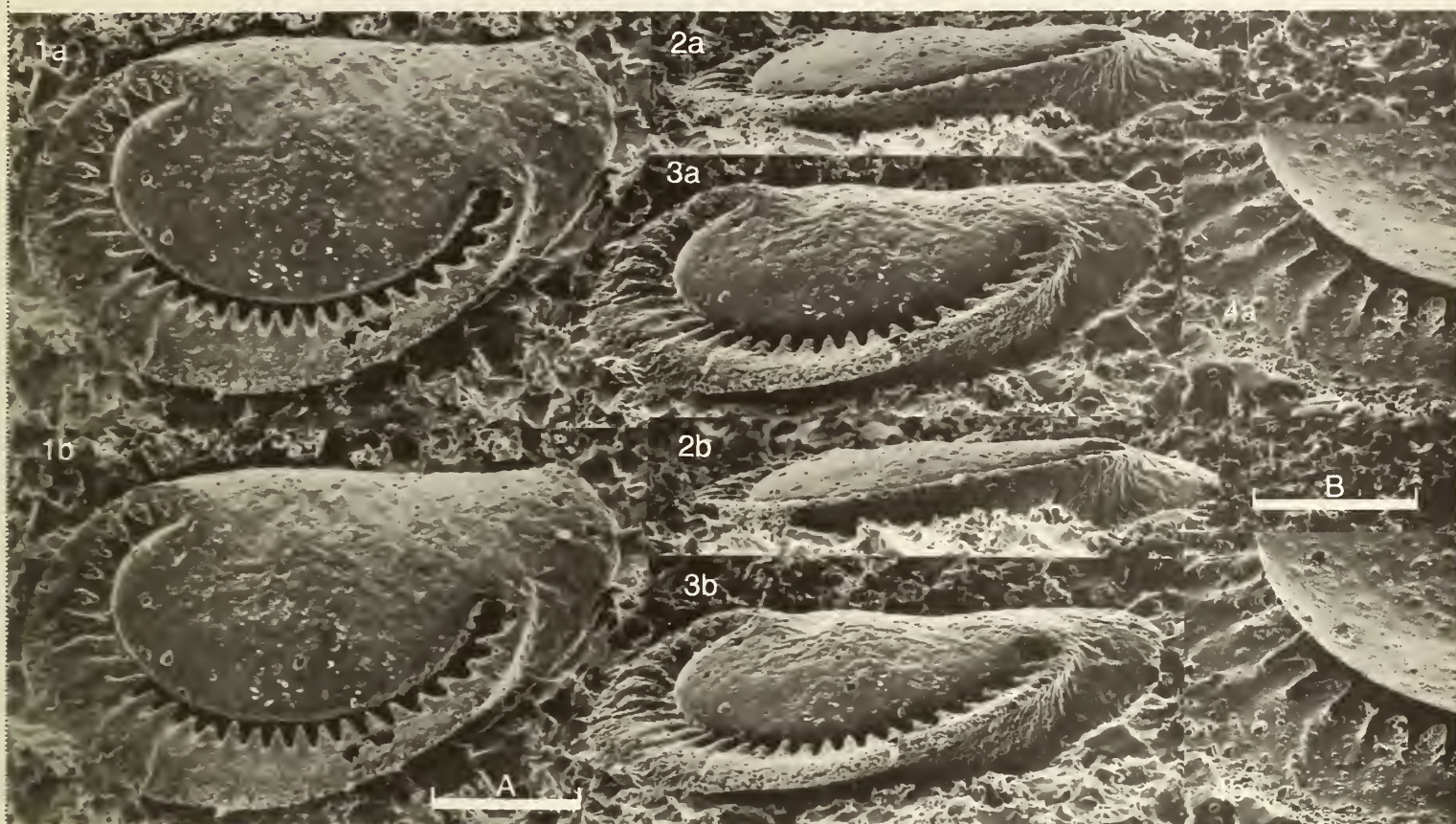
Spinohippula esurialis (3 of 8)

Remarks: (cont.) Schallreuter, *op. cit.*, 1983) from the middle Ordovician of Baltoscandia or *Gracquina hispanica* (Born, 1918) (see J. Vannier, *Palaeontographica A*, **193**, 1986) from the Llandeilo of France and Spain.

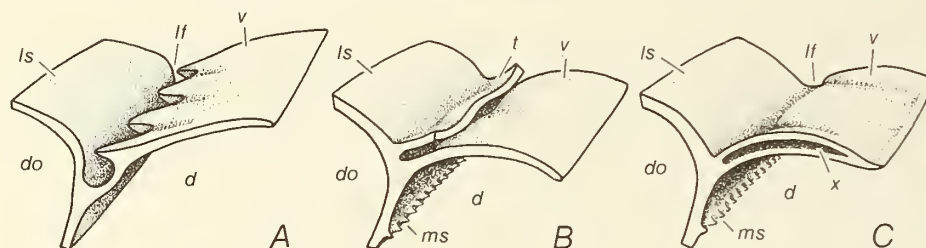
Schallreuter (*op. cit.*, 1983) divided the subfamily Glossomorphitinae into three tribes on the basis of different types of velar dimorphism. *Spinohippula* shares strong similarities with representatives of the tribe Hippulini, especially *Hippula* and *Parahippula*. Although no typical torus is observed (in addition to the velar flange) in *Spinohippula*, the general morphology of its adventral region is strikingly comparable to that of *Hippula* (subgenera *H. (Hippula)* and *H. (Cetona)*) and *Parahippula*. Schematically, the shape (crescent-like sculpture), position and nature (main adventral sculpture with hollow spaces and/or radiating structures) of the velum (Text-fig. 2) are three important characteristics similar in *Spinohippula* from the middle Ordovician of Czechoslovakia, *Parahippula* from the middle Ordovician of United States, and numerous species of *Hippula* from the Ordovician of Europe and North America (see R. Schallreuter & M. Kruta, *N. Jb. Paläont. (Mh)*, **8**, 1980). In *Spinohippula* the row of velar denticulation (26 spines in holotype) (Pl. **14**, 50, fig. 4; Pl. **14**, 52, fig. 4) associated with a deep laterovelar furrow forms a semi-open peripheral groove (Text-fig. 1a) at the junction of the lateral, marginal and velar surfaces. By comparison, *H. (Cetona)* (Text-fig. 1b), an example of a typical unitoral hippuline, exhibits a row of short, flattened tubule-like spaces (= part of torus) connected to the velum, exactly at the same place as the semi-open groove in *Spinohippula*. Moreover, openings of these hollows (13 in females of *H. (C.) cetona cetona* = half the number of velar spines in the holotype of *S. esurialis*) are also impressed on the velar flange surface (cf. Text-figs. 1a & 1b). Similar comparisons could also be attempted with *H. (Hippula)* characterized by two tori (Text-fig. 2d). The velar flange of *Parahippula* (Text-fig. 1c) is considered by Kraft (*Mem. geol. Soc. Am*, **86**, 1962) as a "hollow velate frill formed of two layers continuous with the outer layer of shell wall". The interpretation of this "hollow structure" is problematic, bearing in mind that two-layered structures frequently observed on silicified specimens (see D. J. Siveter, *Stereo-Atlas Ostracod Shells*, **12** (10), pl. 54, fig. 4) may be the result of diagenetic processes. Nevertheless, as stated by Kraft, "the logical structure of the carapace wall" of *Parahippula* is a convincing argument for true hollow spaces within the velum (as reconstructed in Text-fig.

Explanation of Plate 14, 52

Figs. 1-4, ♀ LV (holotype, NM L26073, 1188µm long): fig. 1, ext. dors. obl. (tilted 45°); fig. 2, ext. post. obl. (tilted 75°); fig. 3, ext. ant. obl. (tilted 75°), postero-vent. part of the valve; fig. 4, ext. post. obl. (tilted 55°), antero-vent. part of the valve. Scale A (300µm; ×69), figs. 1, 2; scale B (200µm; ×115), figs. 3, 4.



Remarks: (cont.) 1c). In this case: 1) the hollow spaces (13 in females; Text-fig. 2c) within the velar flange of *Parahippula*, and 2) its deep laterovelar furrow showing 12 secondary radiating tiny furrows on the velar flange, may represent homologous structures of the 13 total hollows of *H. (Cetona)* (Text-fig. 2b) and the semi-open laterovelar groove of *Spinohippula* (Text-fig. 2a) respectively.



Text-fig. 1. Reconstructions of the adventral sculpture in three genera of the tribe Hippulini Schallreuter, 1983: A, *Spinohippula* gen. nov.; B, *Hippula*; C, *Parahippula*. All views represent medioventral cross-sections of valves (see Text-fig. 2). d = dolonal antrum; do = domicilium; lf = laterovelar furrow; ls = lateral surface; ms = marginal sculpture (row of spines); t = torus; v = velar flange; x = probable hollows within the velar flange.

Spinohippula esurialis sp. nov.

Holotype: National Museum, Prague (NM), Czechoslovakia, coll. no. **L26073**; ♀ LV.

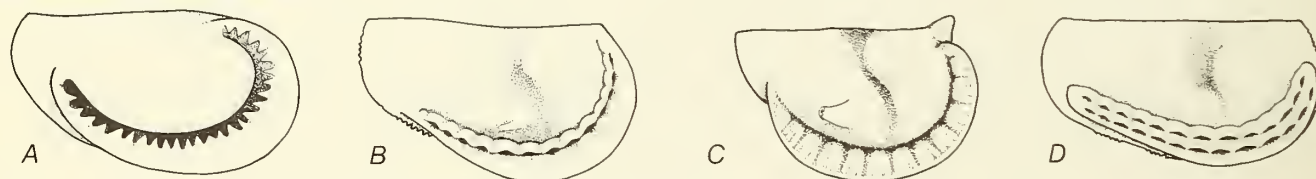
[Paratypes: NM, Prague, coll. nos. **L26074**, tecnomorph RV; **L26075**, ♀ LV]. Casts of the holotype and paratypes are in the Institute of Geology, University of Rennes, France.

Type locality: Ejpovice (borehole), 10km E of Plzen, WSW of Prague, Bohemia, Czechoslovakia; approx. lat. 49° 47'N, long. 13° 38'E. Sandstones, Skalka quartzite Dobrotiva (Llandeilo ?) 'series', Ordovician.

Derivation of name: Latin, *esurialis*, hungry; referring to the teeth-like velar spines.

Explanation of Plate 14, 54

Figs. 1-3, tecnomorph RV (paratype, NM **L26074**, 838µm long): fig. 1, ext. lat.; fig. 2, ext. vent. obl. (tilted 45°); fig. 3, ext. post. obl., part of the valve. Scale A (300µm; ×93), figs. 1, 2; scale B (200µm; ×115), fig. 3.



Text-fig. 2. Three genera of the tribe Hippulini Schallreuter, 1983. All lateral views of female right valves. A, *Spinohippula esurialis* gen. et sp. nov., from the Dobrotiva series (Llandeilo ?) of Czechoslovakia, approximately ×95. B, *Hippula (Cetona) cetona cetona* (Schallreuter, 1964), from Backsteinkalk erratic boulders of northern Germany, middle Ordovician, approximately ×80 (after Schallreuter 1983, *op. cit.* pl. 3, fig. 1). C, *Parahippula ventrospina* (Kraft, 1962), from the middle Ordovician of Virginia, United States, approximately ×65 (after Kraft 1962, *op. cit.*, pl. 12, fig. 5). D, *Hippula (Hippula) latonoda* (Schallreuter, 1964), from the Upper Viru series (Caradoc) of Baltoscandia, approximately ×100 (after Schallreuter 1983, *op. cit.*, pl. 5, fig. 1).

Figured specimens: National Museum, Prague (NM), Czechoslovakia, coll. nos. **L26073** (holotype, ♀ LV; Pl. 14, 50, figs. 1-4; Pl. 14, 52, figs. 1-4), **L26074** (paratype, tecnomorph RV; Pl. 14, 54, figs. 1-3), **L26075** (paratype, ♀ LV; Pl. 14, 56, figs. 1-3). Silicone rubber casts of topotype specimens.

Diagnosis: As for the genus. Monotypic.

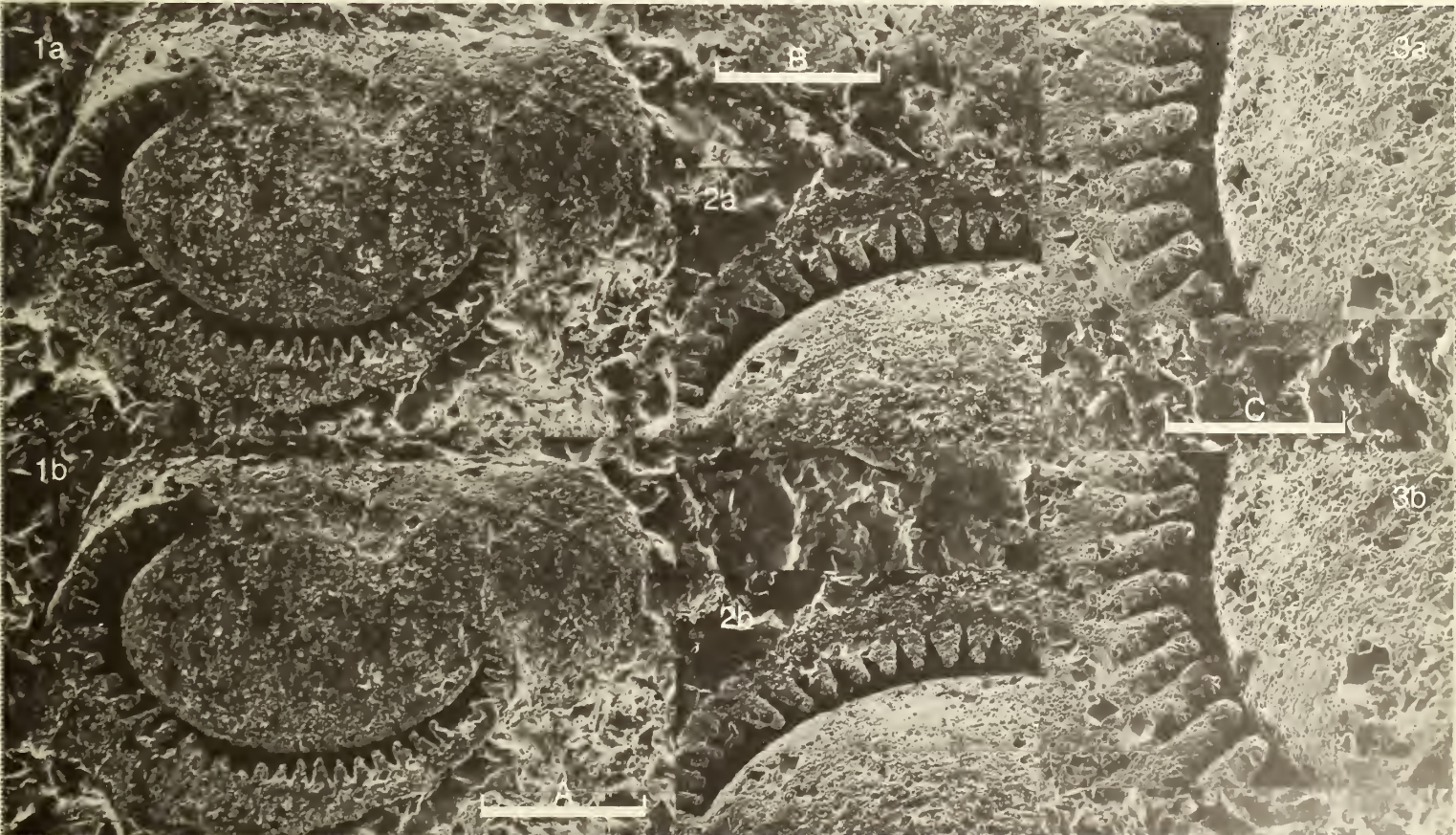
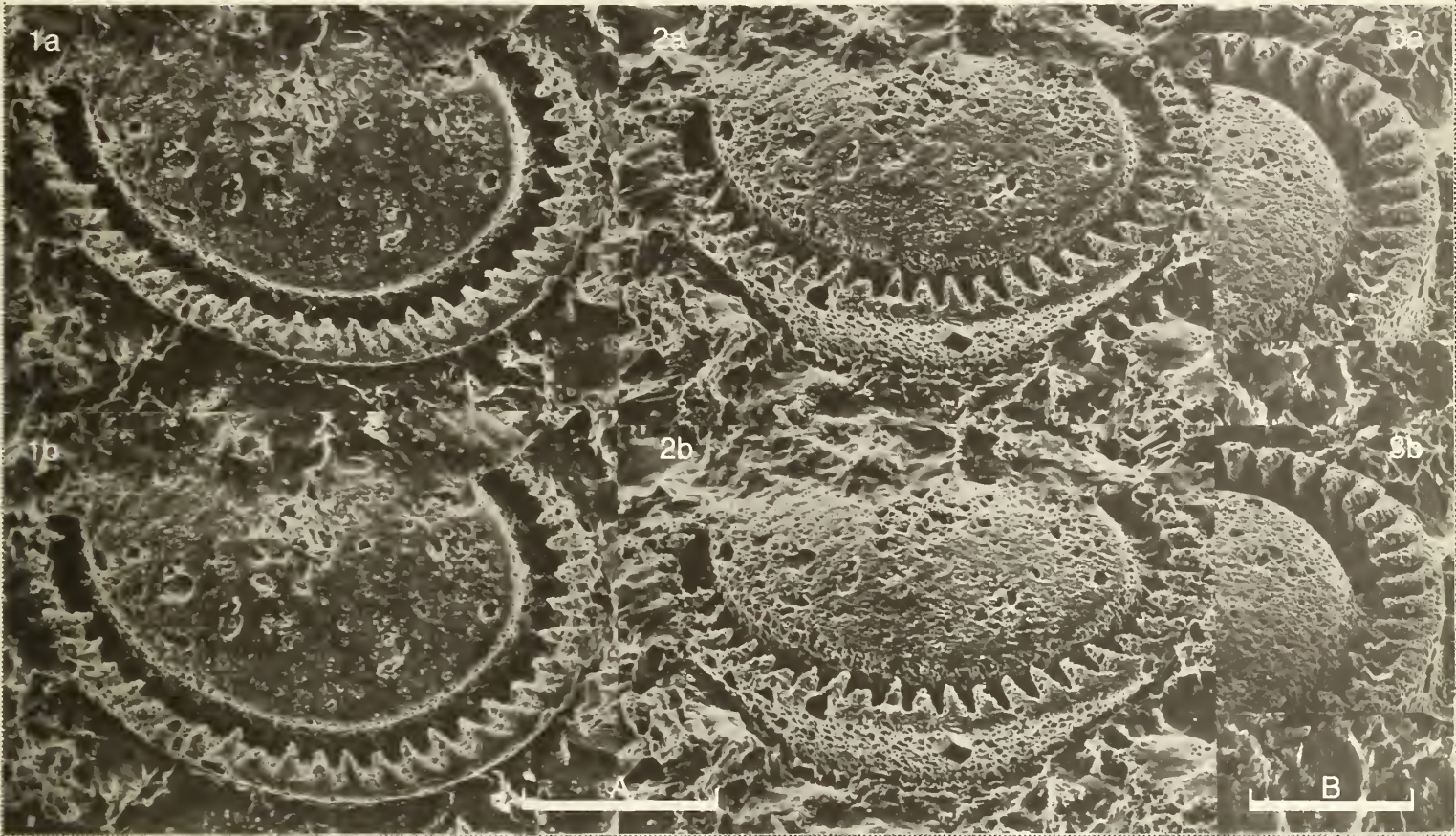
Remarks: The laterovelar furrow represents a major concavity, widely extended ventrally, but not connected to the domiciliar cavity and protected from the outside by a row of spines; it could be interpreted as an external botulus-like brood concavity. More likely, this groove is homologous to a cavum (see R. Schallreuter in R. Maddocks (Ed.), *Proc. 8th Int. Symp. on Ostracoda, Houston, Texas, 1983*) or a fissum. Some tvaerenellids exhibit an arcuate cavum which tends to be closed by spines in the same way as the laterovelar furrow of *S. esurialis*. *Huckea huckea* (see R. Schallreuter, *Palaeontographica A*, **149**, pl. 9, figs. 1-4, 1975) shows a ventral fissum positioned similarly to the furrow in *S. esurialis*. The exact function of the cavum (buoyancy control?) or fissum is still unknown but might represent an attempt to lighten the shell.

Distribution: At present known only from type locality.

Acknowledgements: To the Humboldt Foundation (Bonn) for my Research Fellowship at Hamburg University.

Explanation of Plate 14, 56

Figs. 1-3, ♀ LV (paratype, NM **L26075**, 1107µm long): fig. 1, ext. lat.; fig. 2, ext. dors. obl., postero-vent. part; fig. 3, ext. post. obl., medio-vent. part. Scale A (300µm; ×76), fig. 1; scale B (200µm; ×115), fig. 2; scale C (100µm; ×250), fig. 3.



ON *BEYRICHIA* (*SAGENABEYRICHIA*) *SIVETERI* POLLICOT
subgen. et sp. nov.

by Paul D. Pollicott
(University of Leicester, England)

Subgenus *BEYRICHIA* (*SAGENABEYRICHIA*) subgen. nov.

Type-species: *Beyrichia* (*Sagenabeyrichia*) *siveteri* sp. nov.

Derivation of name: Latin *sagena*, fish-net; alluding to the reticulate ornament of the lobes + the genus *Beyrichia*.
Diagnosis: *Beyrichia* with reticulo-tuberculate lobal ornament. Crumina elongate and relatively well assimilated with lobal area. Syllobium weakly cuspidate; anterior cusp slightly more prominent, posterior often lacking. Syllobial groove low and often above a well developed callus. Zygial arch lacking.

Remarks: The lobal reticulation of *B. (Sagenabeyrichia)* is unique within *Beyrichia*. Moreover, the occurrence of reticulation in an otherwise typical beyrichiine species has significance for beyrichiacean phylogeny, particularly in the relationship between amphitoxotidines and beyrichiines. Henningsmoen (*Geol. Fören. Stockh. Förh.*, **86**, 387-9, 1965) thought that amphitoxotidines, with their typically tubulose velar frill, evolved from beyrichiines (*Beyrichia* subgenera). In contrast, Martinsson (*Bull. geol. Instn. Univ. Uppsala*, **42**, 56, 1963) thought that a stabilized surface reticulation within the amphitoxotidines was entirely foreign to typical beyrichiines (although reticulation is known in atypical Beyrichiidae such as *Bingeria*: see A. Martinsson *Bull. geol. Instn. Univ. Uppsala.*, **41**, 1962), a subfamily which, furthermore, he

Explanation of Plate 14, 58

Fig. 1-3, ♂ RV (PMO 116.231, 2.00 mm long): fig. 1, ext. lat.; fig. 2, ext. vent.; fig. 3, ext. vent. obl. Figs. 4, 5, ♂ LV (PMO 116.232, 1.32 mm long): fig. 4, ext. dors. obl.; fig. 5, ext. lat.

Scale A (370 µm; × 28), figs. 1-3; scale B (260 µm; × 40), figs. 4, 5.

Remarks: (cont.) considered more 'advanced' by lacking a tubulose velum. Henningsmoen (*op. cit.*) thought that reticulation in the beyrichiines was an undeveloped possibility and, if found, its occurrence would indicate a possible beyrichiine derivation for the amphitoxotidines. The lobal reticulation of *Beyrichia (Sagenabeyrichia)* supports his idea.

B. (Sagenabeyrichia) further differs from many typical *B. (Beyrichia)* species by its better assimilated crumina, a feature which it has in common with species of *B. (Simplicibeyrichia)*, especially *B. (S.) callifera* and *B. (S.) duplicicalcarata* (both Martinsson *op. cit.*, 1962). *B. (Sagenabeyrichia)* differs markedly from *B. (S.) globifera* Martinsson, 1962 by its reticulation, lack of a calcarine spine, its often well developed syllobial groove/callus and in having a long, better defined preadductorial sulcus.

Beyrichia (Sagenabeyrichia) siveteri sp. nov.

1954 *Beyrichia (Beyrichia)* cf. *kloedeni* McCoy 1846: G. Henningsmoen, *Norsk. geol. Tidsskr.*, **34**, 40-43 (*pars*), pl. 2, fig. 7, 10-18, pl. 3, figs. 2-7; ? pl. 2, fig. 9.

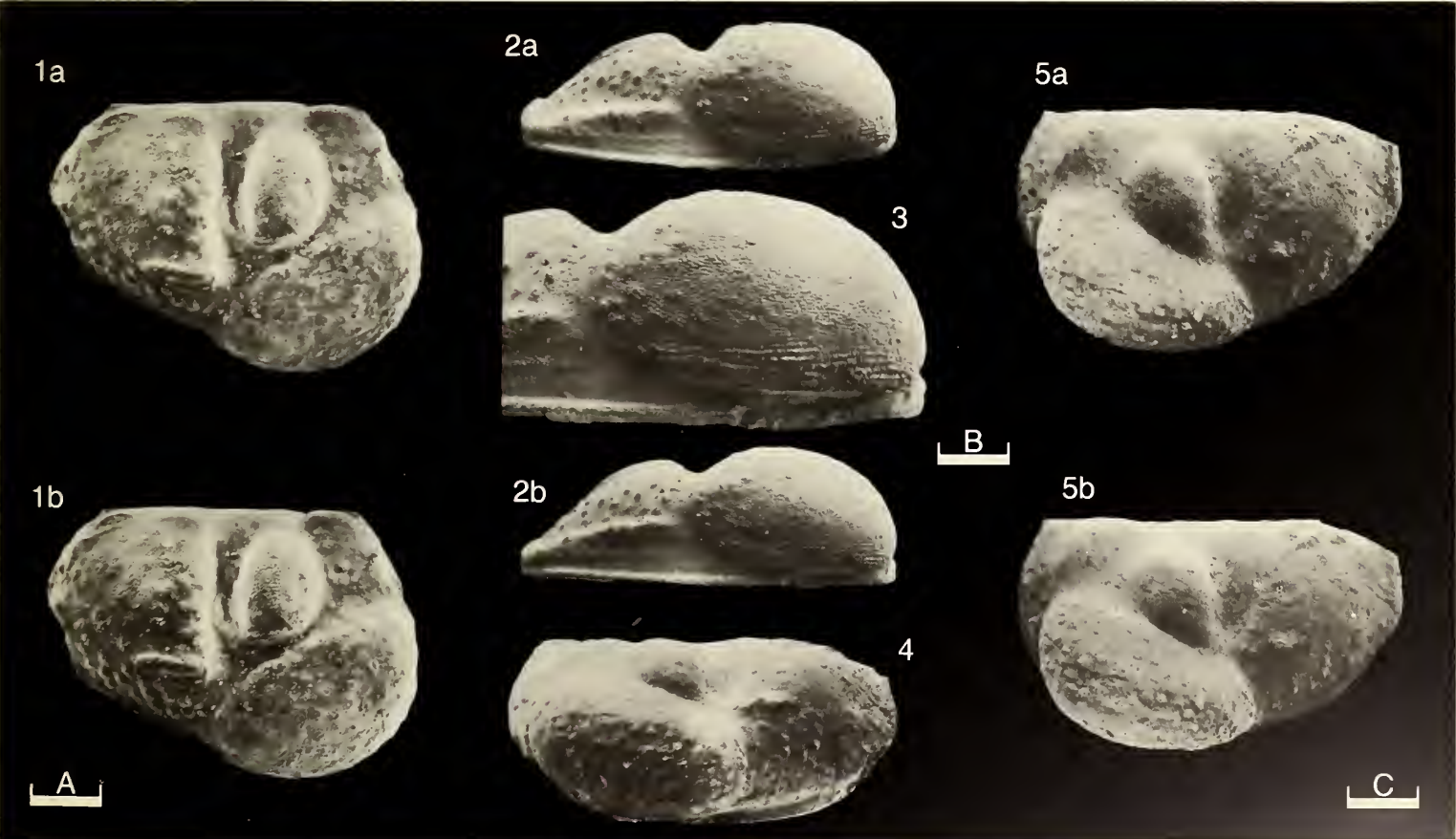
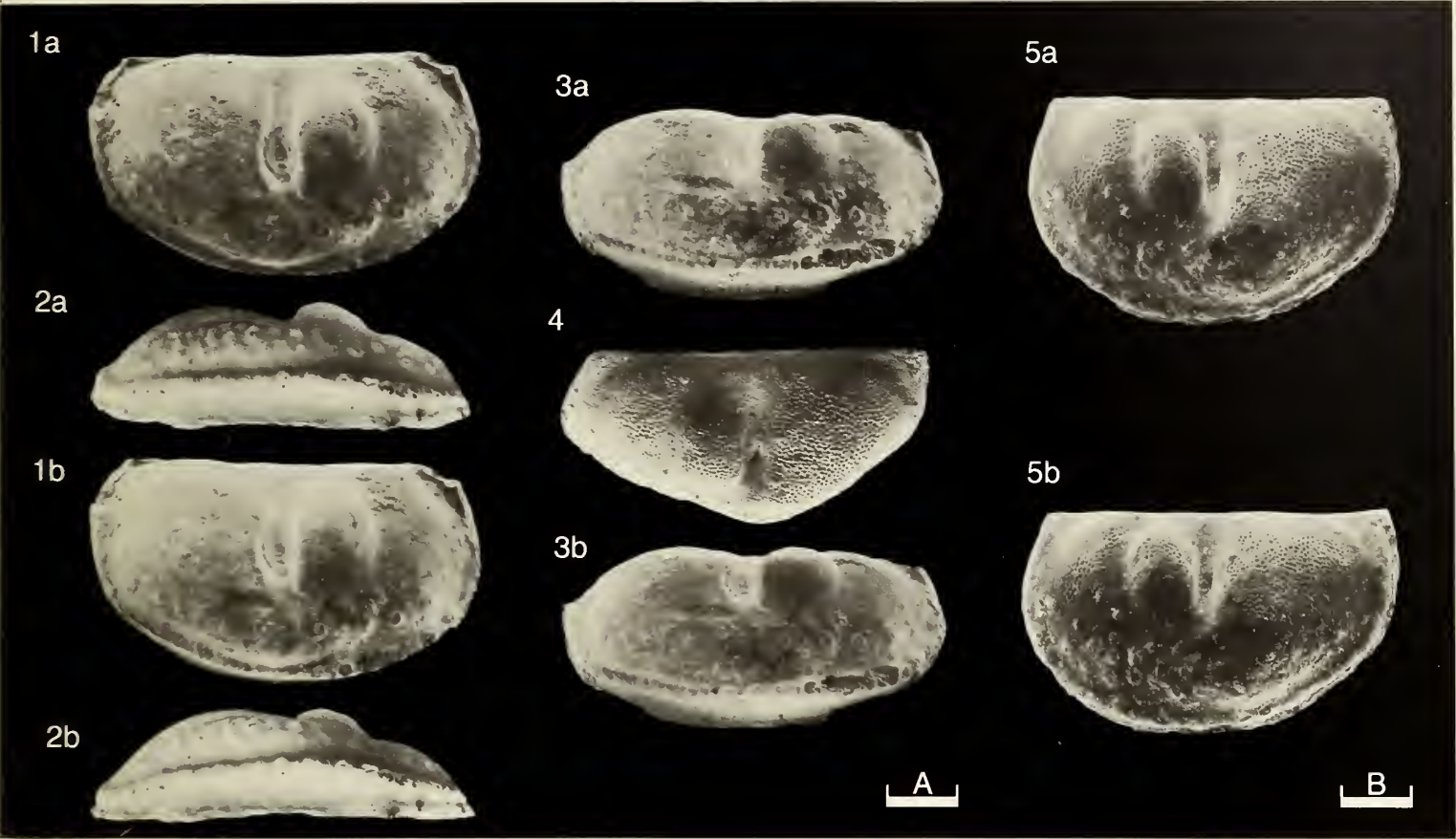
Holotype: Paleontologisk Museum, Oslo, Norway, PMO 116.233; ♀ RV (broken posteriorly).
Type locality: Coastal section, southern tip of Kommersøya (east side), Holmestrand, Norway. Steinsfjorden Formation, '9cβ' of Kiaer (*Skr. Vidensk. Selsk. Kristiania I Mat. – Naturv. Kl.* 1906 **II**, 596 pp.); Wenlock Series, Silurian. Approx. lat. 59° 32'N, long. 10° 18'E.

Derivation of name: After Dr. David J. Siveter, University of Leicester, England.

Figured specimens: Paleontologisk Museum, Oslo, nos. PMO 116.231 (♂ RV: Pl. 14, 58, figs. 1, 2, 3), PMO 116.232 (♂ LV: Pl. 14, 58, figs. 4, 5, Pl. 14, 62, fig. 1), PMO 116.233 (♀ RV: Pl. 14, 60, fig. 1) PMO 116.234 (♀ RV: Pl. 14, 60, figs. 2, 3), PMO 116.235 (♀ LV: Pl. 14, 60, fig. 4, 5), PMO 116.236 (♂ LV: Pl. 14, 62, fig. 2, 5), PMO 116.237 (♂ LV: Pl. 14, 62, fig. 3), PMO 116.238 (♂ LV: Pl. 14, 62, fig. 4), PMO 116.239 (♂ LV: Pl. 14, 64, fig. 1), PMO 116.240 (♂ LV: Pl. 14, 64, fig. 2), PMO 116.241 (♂ RV: Pl. 14, 64, fig. 3).

Explanation of Plate 14, 60

Fig. 1, ♀ RV, ext. lat. (holotype PMO 116.233, 2.00 mm long). Figs. 2, 3, ♀ RV (PMO 116.234, 2.50 mm long): fig. 2, ext. vent.; fig. 3, ext. vent. detail of crumina. Figs. 4, 5, ♀ LV (PMO 116.235, 2.48 mm long): fig. 4, ext. vent. obl.; fig. 5, ext. lat. Scale A (390 µm; × 25), fig. 1; scale B (286 µm; × 35), fig. 3; scale C (470 µm; × 22), figs. 2, 4, 5.



Figured specimens: All figured specimens are from the Steinsfjorden Formation (9c), Sjørvoll, Ringerike, except for **PMO 116.233** (holotype) and **PMO 116.238**, which are from the type horizon and locality. All specimens are prepared by mechanical preparation techniques from limestone slabs.

Diagnosis: As for the subgenus. *B. (Sagenabeyrichia)* is monotypic.

Remarks: *B. (S.) siveteri* exhibits wide variation in both lobal reticulation and tuberculation. Most valves are reticulate over the entire lobal area, but in a few specimens, reticulation is lacking on the anterior lobe (possibly a feature of preservation?). Tuberculation varies from forms with extensive cover (mostly adults) to those in which it is lacking (small tecnomorphs). Reticulation is relatively smaller in larger forms, and tubercles are commonly restricted to a supra-velar field (Pl. 14, 58, figs. 1, 5).

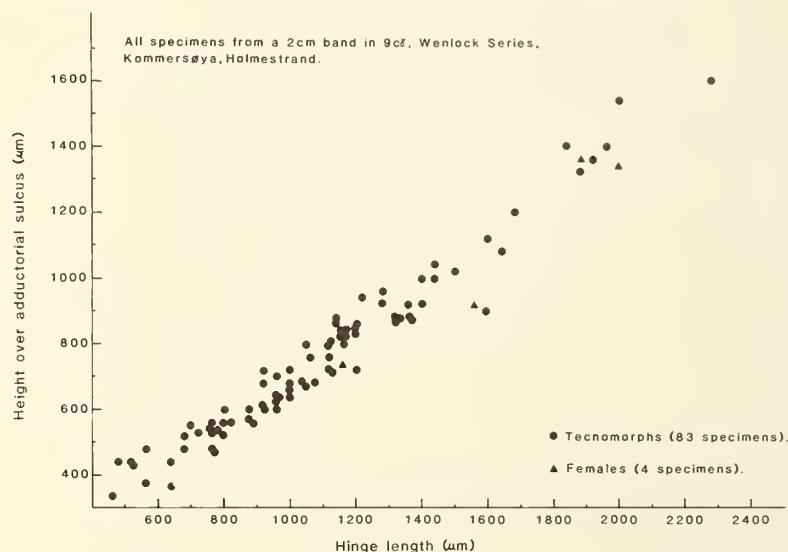
Size variation of female adults is common within a single sample (see Text-fig. 1). This is thought to reflect mixed populations (chronodemes and/or ecodemes) rather than a possible case of precocious dimorphism (unknown in Beyrichiaceae).

Distribution: The Wenlock Series, Silurian of Norway. Collected from localities in the Steinsfjorden Formation (see Worsley, D. (ed.), *Nor. geol. unders.* 384, 1982) at Ringerike (9b-9e of Kiaer, *op. cit.*) and Holmestrand (9b-9c of Kiaer, *op. cit.*).

Explanation of Plate 14, 62

Fig. 1, ♂ LV, reticulation on syllobium (PMO 116.232, 1.32 mm long). Figs. 2, 5, ♂ RV (PMO 116.236, 2.32 mm long): fig. 2, ext. lat.; fig. 5, reticulation and tuberculation on syllobium. Fig. 3, ♂ LV, ext. lat. (PMO 116.237, 2.48 mm long). Fig. 4, ♂ LV, ext. lat. (PMO 116.238, 1.20 mm long).

Scale A (21 µm; × 460), fig. 1; scale B (455 µm; × 23), figs. 2, 3; scale C (230 µm; × 40), fig. 4; scale D (62 µm; × 150), fig. 5.

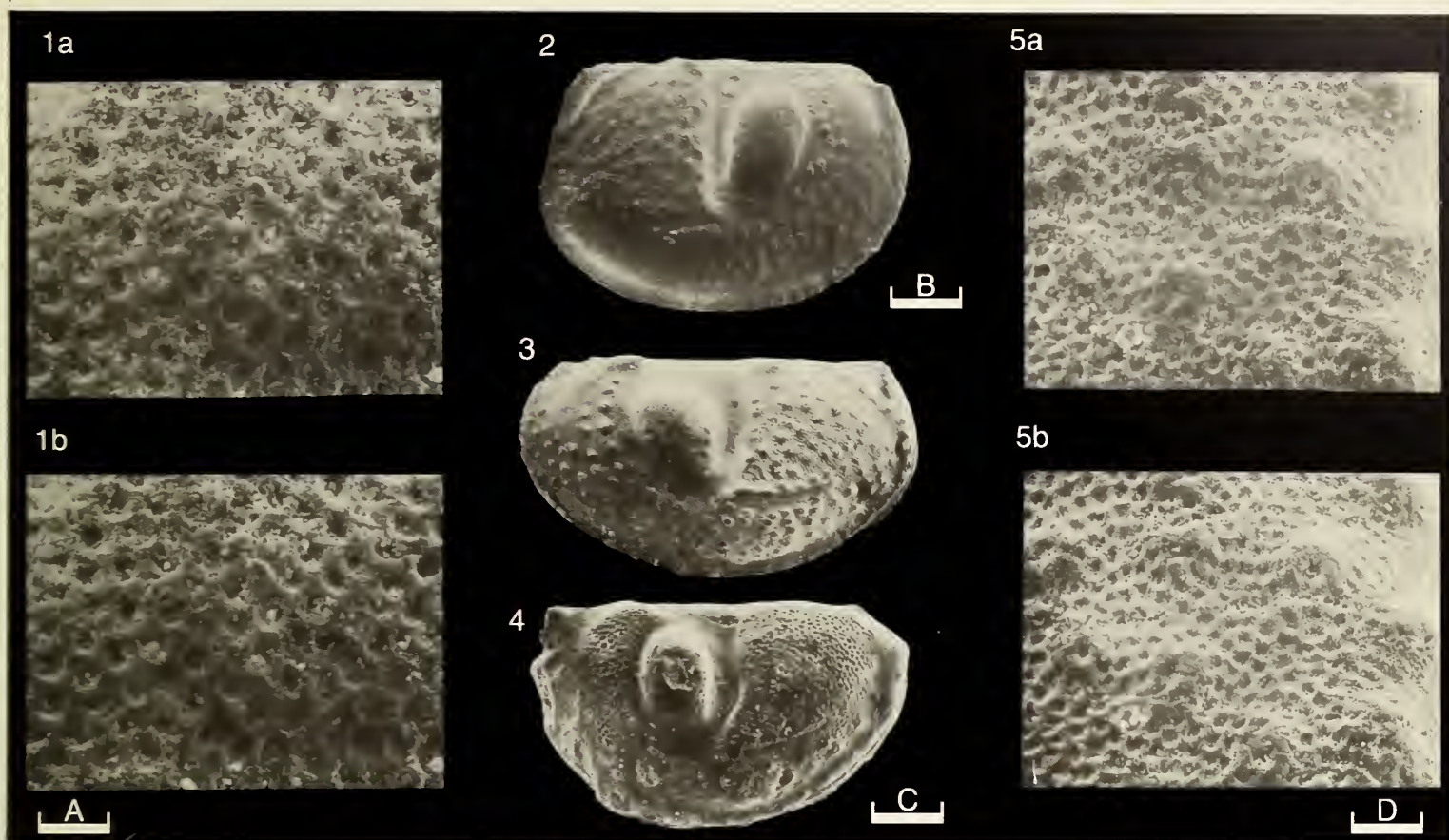


Text-fig. 1. Size variation within *B. (Sagenabeyrichia) siveteri* from the Steinsfjorden Formation (9c of Kiaer *op. cit.*), Wenlock Series at Kommersøya, Holmestrand, Norway.

Explanation of Plate 14, 64

Fig. 1, ♂ LV, ext. lat. (PMO 116.239, 2.72 mm. long). Fig. 2, ♂ LV, ext. lat. (PMO 116.240, 2.68 mm. long). Fig. 3 ♂ RV, ext. lat. (PMO 116.241, 2.68 mm. long).

Scale A (545 µm; × 18), figs. 1-3.



ON BYTHOCY THERE INTERMEDIA ELOFSON

by David J. Horne
(Geology Department, City of London Polytechnic)

Bythocythere intermedia Elofson, 1938

1868 *Bythocythere constricta* Sars; G. S. Brady, *Trans. Linn. Soc. Lond.*, **26**, (pars), 451–452, pl. 35, figs. 48–52 only (non pl. 35, fig. 47) (non Sars, 1866).

1938 *Bythocythere intermedia* sp. nov. O. Elofson, *Ark. Zool.*, **30A**, 10, text-figs. 14–21.

1983 *Bythocythere intermedia* Elofson; J. Athersuch, D. J. Horne & J. E. Whittaker, *J. micropalaeontol.*, **2**, 72–73, text-figs. 1, 2, 3a–g, 4r–t, 5b; pl. 2, figs. 1–4.

Type specimens: The whereabouts of Elofson's type material is not known.

Type locality: The Mittskaren, outside the mouth of Gullmar Fjord, W. Sweden, approx. lat. 58°15' N, long. 11°30' E; Recent, marine, sublittoral.

Figured specimens: British Museum (Nat. Hist.) nos. **1982.345** (♂ LV: Pl. **14**, 68, fig. 1; copulatory appendage: Text-fig. 1), **1982.346** (♀ LV: Pl. **14**, 66, fig. 2; RV: Pl. **14**, 66, fig. 3), **1982.347** (♂ LV: Pl. **14**, 68, figs. 2, 3), **1982.348** (♂ LV: Pl. **14**, 66, fig. 1). All from Valentia, SW Ireland (approx. lat. 51°55' N, long. 10°20' W), taken from slides labelled "*B. constricta*" in the Norman Collection at the British Museum (Nat. Hist.); nos. **1982.345–347** are from slide **1900–3–6–379**, no. **1982.348** is from slide **1911.11.8 M3725**.

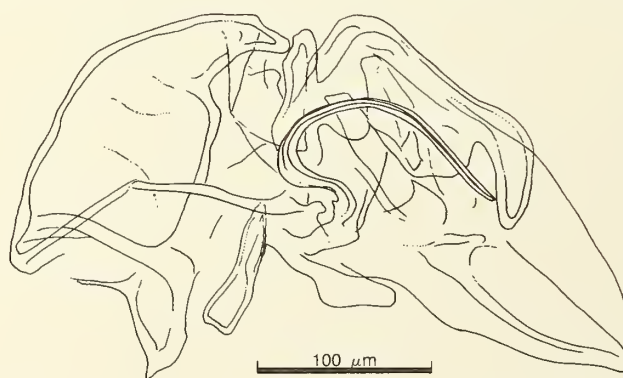
Diagnosis: Moderately large (750–850 µm long) species of *Bythocythere*; carapace moderately inflated, greatest width a little behind mid-length. Greatest height well behind mid-length. Dorsal margin convex in female, almost straight in male; ventral margin weakly sinuous in both sexes. Posterior margin denticulate. Dorsomedian sulcus weak. Male copulatory appendage with a relatively large, subtriangular distal process.

Explanation of Plate 14, 66

Fig. 1, ♂ LV, ext. lat. (**1982.348**, 840 µm long); figs. 2, 3, ♀ (**1982.346**, 810 µm long): fig. 2, LV, ext. lat.; fig. 3, RV, ext. lat. Scale A (100 µm; ×80), figs. 1–3.

Remarks: Early records of *B. constricta* Sars from British waters are now believed to be referable to either *B. intermedia* or *B. zetlandica* Athersuch, Horne & Whittaker, 1983 (see Horne, *Stereo-Atlas Ostracod Shells*, **14**, 69–72, 1987), neither of which possesses the deep median sulcus which is characteristic of Sars' species. *B. zetlandica* has a smooth posterior margin and is less elongate with a generally less rounded lateral outline than *B. intermedia*. A closely similar Miocene species, *B. neerlandica* Kuiper, 1918, is less elongate, less tapered anteriorly, and has a deeper dorsomedian sulcus than *B. intermedia*.

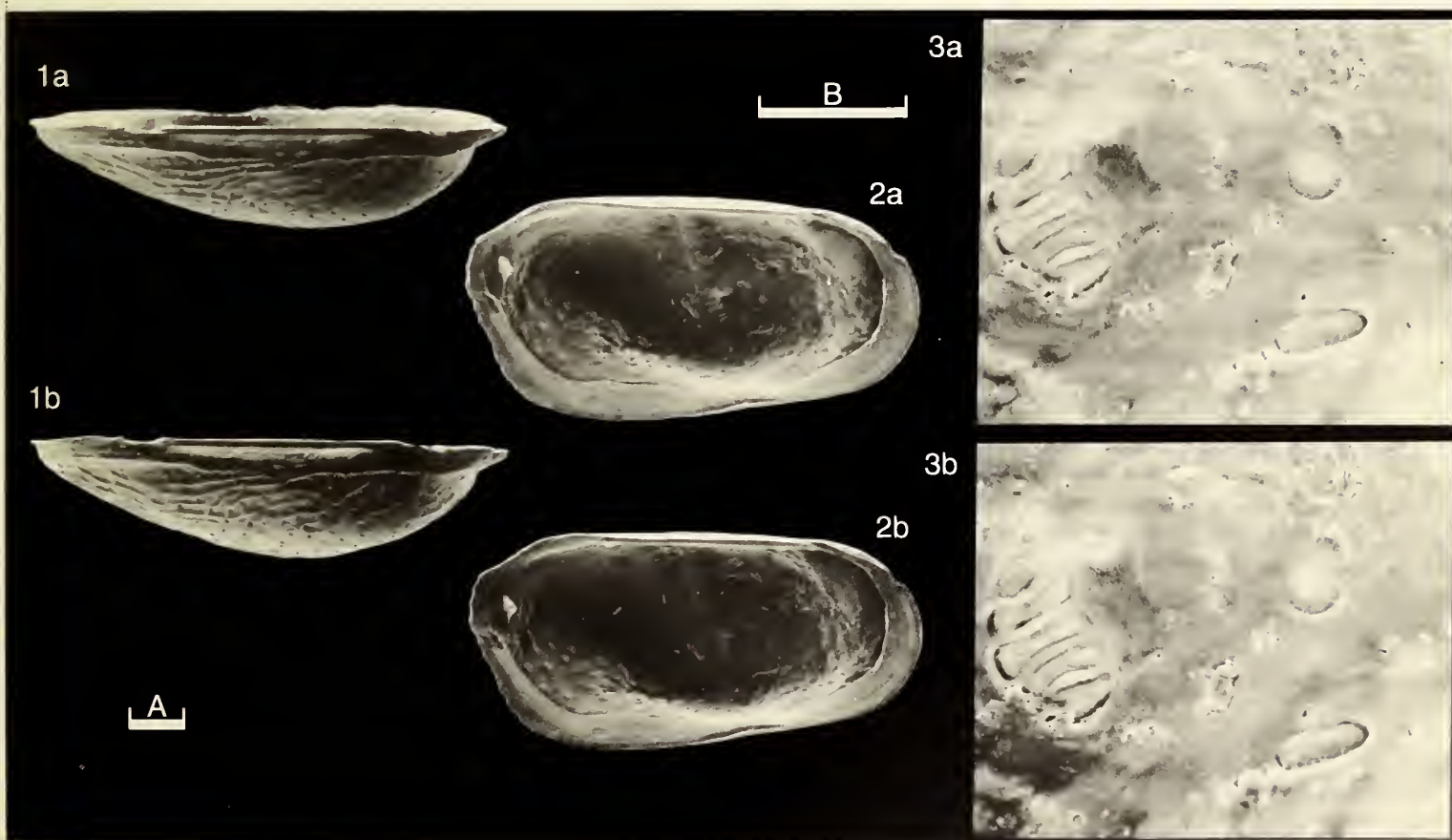
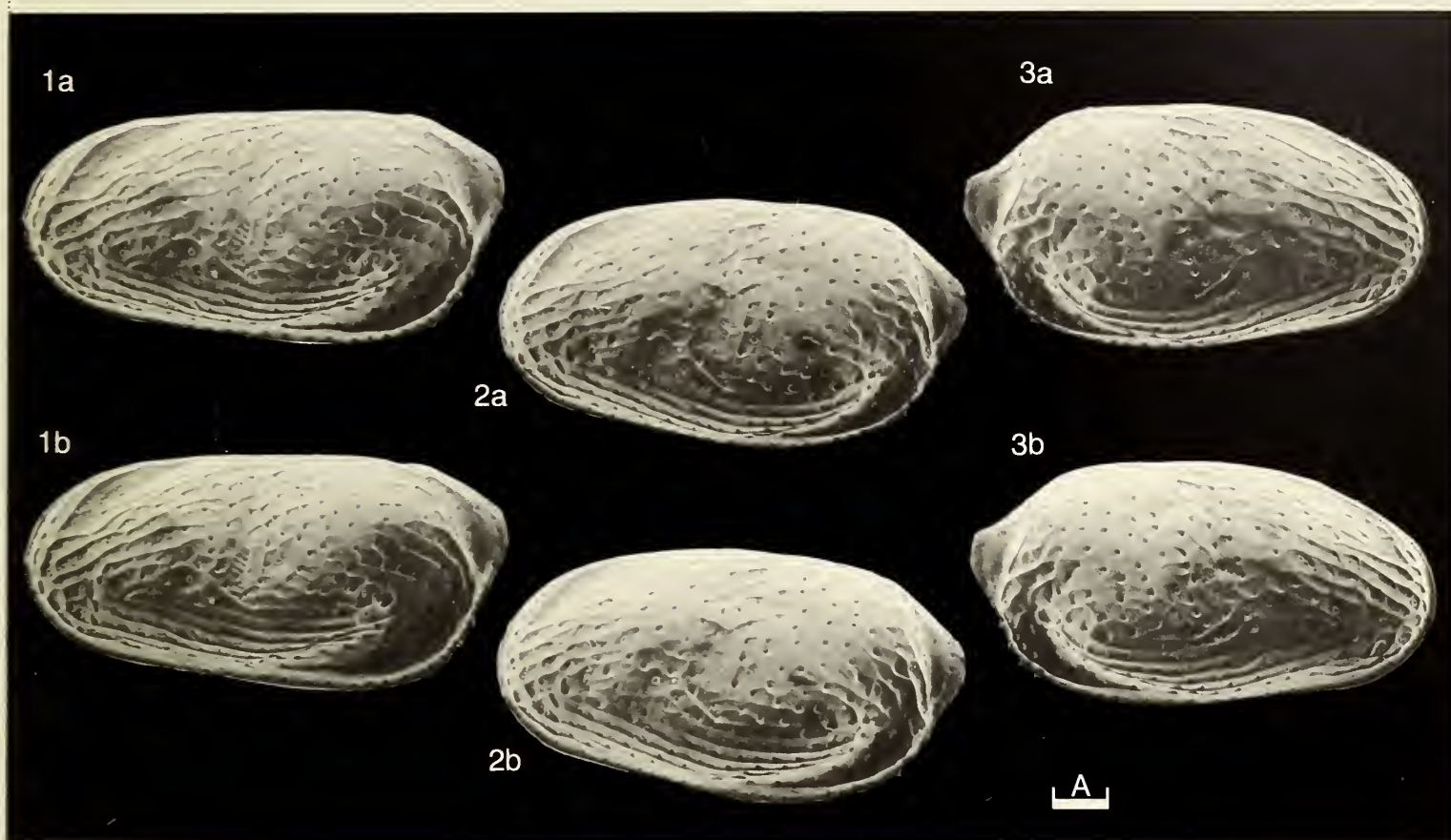
Distribution: Fairly common in sublittoral marine waters around British coasts, the southern North Sea, S Norway and Sweden, and as far south as the Bay of Biscay.



Text-fig. 1 *Bythocythere intermedia*, male copulatory appendage (**1982.345**).

Explanation of Plate 14, 68

Fig. 1, ♂ LV, dors. (**1982.345**, 820 µm long); figs. 2, 3, ♂ LV (**1982.347**, 790 µm long): fig. 2, int. lat.; fig. 3, central muscle scar field. Scale A (100 µm; ×80), figs. 1, 2; scale B (50 µm; ×400), fig. 3.



ON *BYTHOCY THERE ZETLANDICA* ATHERSUCH,
HORNE & WHITTAKER

by David J. Horne
(Geology Dept, City of London Polytechnic)

Bythocythere zetlandica Athersuch, Horne & Whittaker, 1983

1868 *Bythocythere constricta* Sars; G. S. Brady, *Trans. Linn. Soc. Land.*, 26, (pars), 451, pl. 35, fig. 47 only (non pl. 35, figs 48-52) (non Sars, 1866).

1983 *Bythocythere zetlandica* sp. nov. J. Athersuch, D. J. Horne & J. E. Whittaker, *J. micropalaeontol.*, 2, 73, text-figs 41-n, 5c, pl. 2, figs 5-8.

Holotype: British Museum (Nat. Hist.) no. **1982.350**, ♀ carapace and appendages.
[Paratype, no. **1982.351**, ♂ carapace and appendages.]

Type locality: Unst Haaf (fishing grounds off Unst), Shetland, approx. lat. 61° 00'N, long. 1° 30'W; Recent, marine, sublittoral.

Figured specimens: British Museum (Nat. Hist.) nos. **1982.350** (holotype, ♀ LV: Pl. 14, 70, fig. 2; RV: Pl. 14, 70, fig. 3), **1982.351** (paratype, ♂ LV: Pl. 14, 70, fig. 1), **1982.352** (♂ LV: Pl. 14, 72, fig. 1; copulatory appendage: Text-fig. 1), **1982.353** (♂ LV: Pl. 14, 72, figs 2-3). All taken from slides labelled "*B. constricta*" in the Norman Collection at the British Museum (Nat. Hist.): the holotype and paratype are from slide no. **1900-3-6-379**; nos **1982.352** and **1982.353**, both from Valentia, SW Ireland (approx. lat. 51° 55'N, long. 10° 20'W), are from slides **1900-3-6-379** and **1911.11.8. M3725** respectively.

Explanation of Plate 14, 70

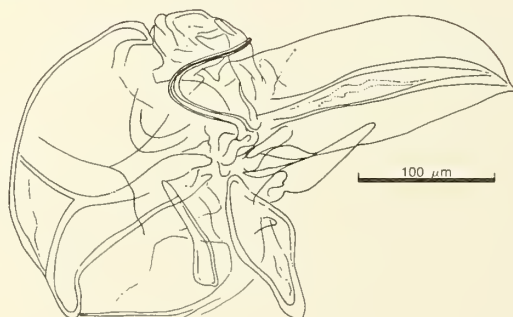
Fig. 1, ♂ LV, ext. lat. (paratype, **1982.351**, 770 µm long); figs. 2, 3, ♀ (holotype, **1982.350**, 790 µm long): fig. 2, LV, ext. lat.; fig. 3, RV, ext. lat.

Scale A (100 µm; × 80), figs 1-3.

Diagnosis: Moderately large (750-800 µm long) species of *Bythocythere*; carapace strongly inflated, greatest width a little behind mid-length. Dorsal and ventral margins virtually straight, converging anteriorly, greatest height well behind mid-length. Posterior margin smooth. Dorsomedian sulcus weak. Distal process of male copulatory appendage relatively long, with a convex anterior margin and an almost straight posterior margin.

Remarks: *B. zetlandica* was formerly confused with *B. constricta* Sars, which does not live in British waters; Sars' species has a characteristically deep dorsomedian sulcus, and the distal process of its male copulatory appendage is more symmetrical and slender than that of *B. zetlandica*. A similar NW European species, *B. intermedia* Elofson, 1938 (see Horne, *Stereo-Atlas Ostracod Shells* 14, 65-68, 1987), is more elongate than *B. zetlandica* and has a denticulate posterior margin and a more rounded outline in lateral view.

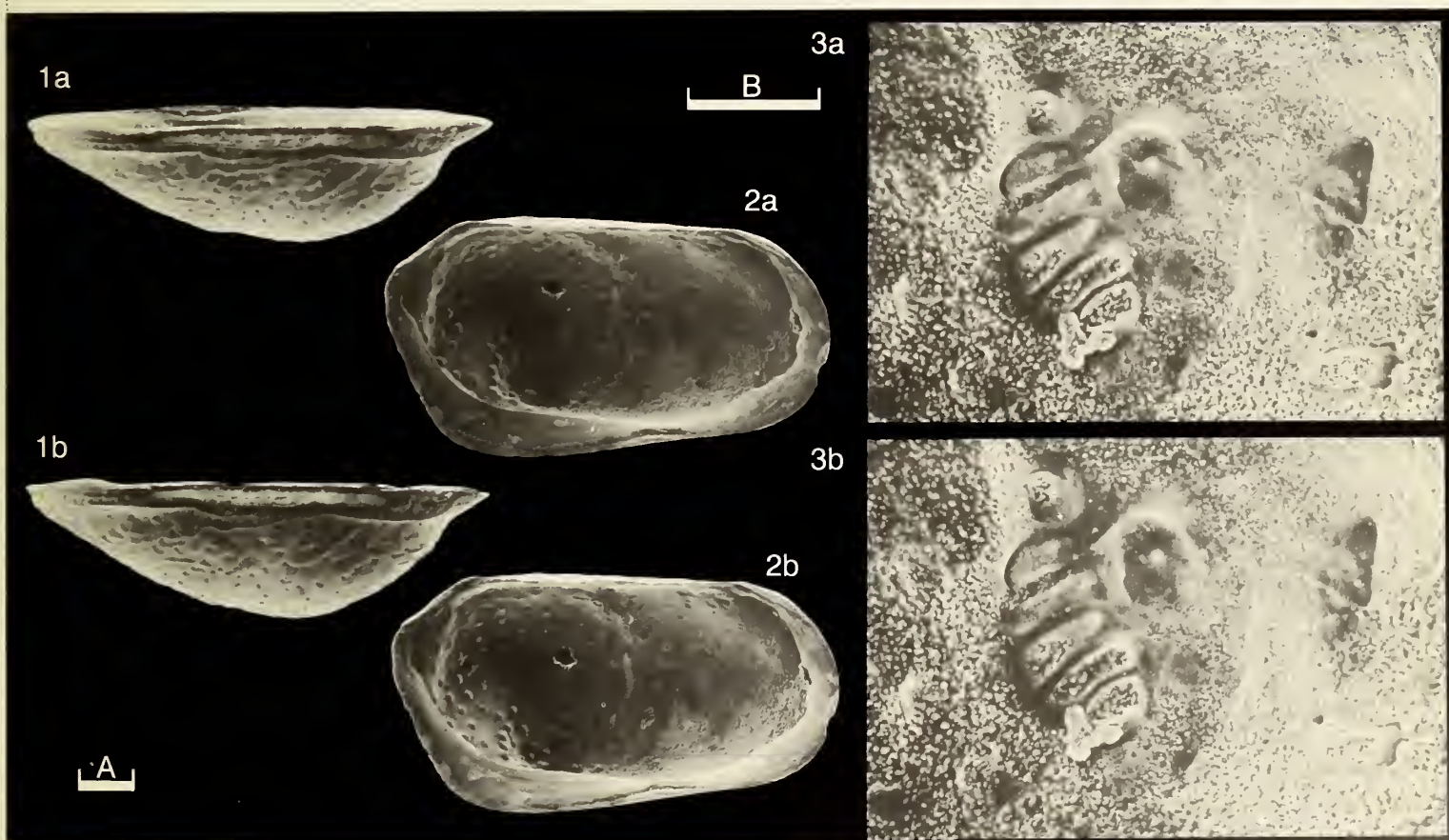
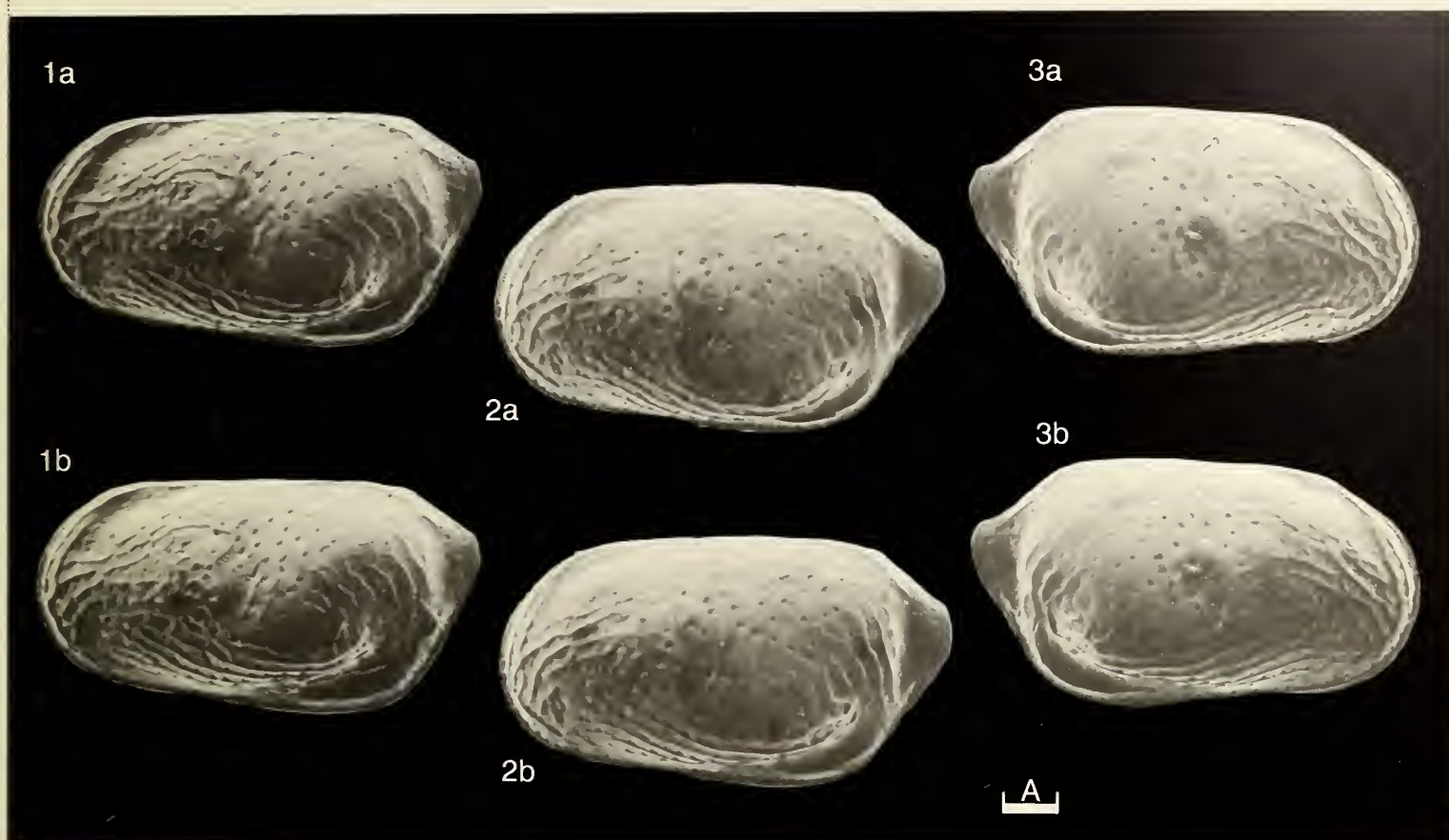
Distribution: A marine species found in sublittoral waters around British coasts, particularly in the north.



Text-fig. 1 *Bythocythere zetlandica*, male copulatory appendage (**1982.352**).

Explanation of Plate 14, 72

Fig. 1, ♂ LV, dors. (**1982.352**, 800 µm long); figs 2, 3 ♂ LV (**1982.353**, 780 µm long): fig. 2, int. lat.; fig. 3, central muscle scar field. Scale A (100 µm; × 80), figs 1, 2; scale B (50 µm; × 400), fig. 3.



Stereo-Atlas of Ostracod Shells: Vol. 14, Part 1

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